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REDD, PINC, and Other Shades of Green: Institutional Requirements for an International Forest Carbon Sequestration Treaty in a Post-Kyoto World

ABSTRACT

As the United Nations Framework Convention on Climate Change moves closer to an agreement on reducing emissions from deforestation and degradation, more attention must be paid to the institutions that would support an international forest carbon sequestration (IFCS) program. This article identifies key support services that are needed for any IFCS agreement, such as (1) a platform for negotiation and information provision, (2) monitoring and verification of carbon stocks, and (3) dispute resolution. The UNFCCC has not yet selected and designed a particular IFCS program, however. Different programs use different funding streams, calculate carbon savings in different ways, and present different types of risk to individual nations and the international community. These differences have implications for the type of support services needed to support different IFCS programs. This article examines three possible IFCS models to assess the way that IFCS program design affects the key support services needed, and presents a framework for analysis that allows policymakers to recognize the tradeoffs inherent in any set of institutional choices, and select institutions that will support a continued role for IFCS in combating climate change.

INTRODUCTION

Because forests play a critical role in the global carbon cycle, the international community is actively pursuing policies and programs to increase the amount of carbon stored in forests. Recent estimates suggest that forests could contribute an average 6.7 billion tons of emissions re-

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ductions annually, with over two-thirds of this potential coming from tropical nations.¹ Making full use of the forest carbon sink² is appealing to both the developed and the developing world. Developed nations see forest carbon projects as a low-cost option for mitigating climate change. For the developing world, forest carbon payments could provide a sustainable source of much-needed income.

At the most recent climate negotiation talks in Copenhagen, Denmark, and Cancun, Mexico, parties³ to the United Nations Framework Convention on Climate Change (UNFCCC) have moved closer to a framework agreement on forest carbon.⁴ The Cancun Agreement, adopted by the UNFCCC in December 2010, calls on the parties to prepare for an agreement that would include developing countries' forest carbon stocks and emissions in the broader international climate change agreement.⁵ For developing country parties, preparatory activities should include determining baseline forest stocks or emissions levels, preparing national forest strategy plans, and developing methods for monitoring forest activities.⁶ Developed country parties are urged to support these efforts through bilateral and multilateral arrangements that

1. Brent Sohngen, *An Analysis of Forestry Carbon Sequestration as a Response to Climate Change*, COPENHAGEN CONSENSUS CTR. 11 (2009), available at http://fixthecclimate.com/updates/tx_templavoila/AP_Forestry_Sohngen_v.2.0.pdf.

2. The term "carbon sink" refers to areas or reservoirs that store carbon. The major sinks in the carbon cycle are the atmosphere, the terrestrial biosphere, oceans, and sediments. See I.C. Prentice et al., *The Carbon Cycle and Atmospheric Carbon Dioxide*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, available at <http://www.ipcc.ch/ipccreports/tar/wg1/pdf/TAR-03.PDF>. Within the terrestrial biosphere, vegetation in forests, grasslands, wetlands, and other ecosystems take in carbon, thereby removing carbon dioxide from the atmosphere. In recent years, these terrestrial systems have stored an estimated 1.9 PgC/yr, acting as a major carbon sink. *Id.* at 185.

3. "Parties" refer to countries that are official members who have signed and ratified the United Nations Framework Convention on Climate Change or another international treaty.

4. See U.N. Framework Convention on Climate Change, Conference of the Parties, 16th Sess., Nov. 29–Dec. 10, 2010, paras. 70, 71, 73, 76, U.N. Doc. FCCC/CP/2010/7/Add.1 (Mar. 15, 2011), <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf> [hereinafter Cancun Agreement]; see also UNFCCC, Conference of the Parties, 15th Sess., Dec. 7–19, 2009, para. 6, U.N. Doc. FCCC/CP/2009/11/Add.1 (Mar. 30, 2010), available at <http://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf> ("We recognize the crucial role of reducing emission from deforestation and forest degradation and the need to enhance removals of greenhouse gas emission by forests and agree on the need to provide positive incentives to such actions through the immediate establishment of a mechanism including REDD-plus, to enable the mobilization of financial resources from developed countries.").

5. See Cancun Agreement, at pt. III.C.

6. See Cancun Agreement, at para. 71.

provide much-needed funding and technical resources to developing countries.⁷

The Cancun Agreement has also instructed the UNFCCC's working group on Long-term Cooperative Action (LCA)⁸ to explore finance mechanisms to implement "results-based" actions in the forest sector.⁹ Similar mechanisms have been on the UNFCCC's agenda since 2005, when the first financial mechanism for reducing emissions from deforestation and degradation (REDD) was formally introduced.¹⁰ In recent years, most parties have submitted REDD or REDD+ proposals, promoting the forms of REDD that would best represent their national interests. REDD+ proposals go beyond forest-sector emissions reductions and seek to enhance developing country forest carbon stocks through activities such as afforestation, reforestation, and forest management.¹¹ REDD+ programs thus are much broader in scope than REDD proposals. Where REDD proposals seek only to reduce the emissions that come from deforestation and degradation in developing countries, REDD+ programs offer an opportunity to use the vast amount of existing and potential forested lands in developing countries as massive sinks for carbon sequestration. The LCA is now tasked with exploring and assessing these options. It must also report back to the next meeting of the Conference of the Parties (COP), possibly with a draft decision on REDD or REDD+.¹² However, no single approach has been selected by the parties. Unlike other aspects of the climate change negotiations, most observers expect the UNFCCC to come to an eventual agreement on REDD and REDD+. Before a policy approach and financial mechanism can be selected, however, numerous issues need to be addressed. These issues include technical concerns about how countries will accurately monitor forest changes, policy concerns about how countries can effectively address the drivers

7. See Cancun Agreement, at para. 76.

8. LCA is a subsidiary committee under the UNFCCC tasked with identifying long-term options to continue the UNFCCC's work on climate change through the end of the first Kyoto Protocol compliance period and beyond. See Ad Hoc Working Group on Long-term Cooperative Action, UNFCCC, <http://unfccc.int/bodies/body/6431.php> (last visited Feb. 17, 2012).

9. Cancun Agreement, *supra* note 4, at para. 77.

10. A proposal titled "Reducing Emissions from Deforestation in Developing Countries: Approaches to Stimulate Action" was first introduced to the UNFCCC at its eleventh Conference of the Parties in Montreal in December, 2005, when Costa Rica and Papua New Guinea introduced the first official REDD proposals. See UNFCCC, Conference of the Parties, Item 6 of the Provisional Agenda, U.N. Doc. FCCC/CP/2005/Misc.1 (Nov. 11, 2005), available at <http://unfccc.int/resource/docs/2005/cop11/eng/misc01.pdf>.

11. See generally CHARLIE PARKER ET AL., *THE LITTLE REDD+ BOOK* (3d ed. 2009) (giving an overview of the range of options).

12. Cancun Agreement, *supra* note 4, at para. 77.

of deforestation, and social concerns about which domestic groups are likely to benefit or be harmed by widespread REDD activities.¹³

The international community is actively seeking to address these issues through a wide range of channels. The UNFCCC's advisory body on scientific matters, the Subsidiary Body on Scientific and Technological Advice (SBSTA), is preparing forest monitoring protocols that must be in place before any REDD program can be implemented.¹⁴ In the meantime, wealthy forest nations such as Norway and Japan have entered into bilateral agreements with individual rainforest nations to fund forest management efforts.¹⁵ In addition, multilateral organizations such as the World Bank¹⁶ are working to improve developing countries' capacity to participate in a REDD program. These efforts are also gaining the attention of donors: at the UNFCCC meeting in Copenhagen, six donor nations committed \$3.5 billion to jump-start a program to reduce emissions from, and increase carbon sequestration in, the world's forests.¹⁷

As the international community moves closer to an agreement on terrestrial carbon sequestration, it is important to consider the types of institutions that will be required to support an international forest carbon sequestration (IFCS) agreement.¹⁸ Many academics and practitioners have observed that an IFCS agreement must be supported by mechanisms to measure and monitor carbon sequestration gains (or avoided losses) by participants, to certify and track carbon trades, to finance investments in the forest sector, and to enforce violations of the agreements.¹⁹ While these needs are not exhaustive, they illustrate the full range of institutional requirements for IFCS.

13. See, e.g., UNFCCC, Subsidiary Body for Scientific and Technological Advancement, Rep. on the Second Workshop on Reducing Emissions from Deforestation in Developing Countries, 26th Sess., May 7–18, 2007, U.N. Doc.FCCC/SBSTA/2007/3 (Apr. 17, 2007).

14. Cancun Agreement, *supra* note 4, at para. 75, app. II.

15. See *infra* note 185.

16. See *infra* notes 75, 182, 183.

17. U.S. Dep't of Agric., United States Announces \$1 Billion to Reduce Forest Emissions (Dec. 16, 2009), <http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2009/12/0618.xml> (last visited May 2, 2012) (announcing the decision by the U.S., Australia, France, Japan, Norway, and the United Kingdom to commit \$3.5 billion to reducing global emissions from deforestation).

18. Hereinafter, this paper will refer to REDD, REDD+, and similar proposals as international forest carbon sequestration agreements.

19. See, e.g., Randall S. Abate & Todd A. Wright, *A Green Solution to Climate Change: the Hybrid Approach to Crediting Reductions in Tropical Deforestation*, 20 DUKE ENVTL. L. & POL'Y F. 87, 102 (2010) (explaining the need for systems to monitor and track forest changes); Gia Schneider, et al., *Banking on the Environment: Profiting from Investment in REDD*, 24 NAT. RESOURCES & ENV'T 14, 14 (2009) (discussing the complex financing needs of REDD); Michael L. Brown, Note, *Limiting Corrupt Incentives in a Global REDD Regime*, 37 ECOLOGY

This article explores the institutional needs of IFCS and reaches two conclusions. First, for reasons explained below, the types of institutions required for a successful IFCS program differ from those involved in a global emissions trading program. Second, the IFCS programs under consideration vary considerably, and the types and extent of institutions required will also differ substantially. To create and implement an IFCS program that effectively incorporates forests into an agreement on carbon emissions, the international community will need to provide support for participation in negotiations, develop institutions to implement and govern the program, devise mechanisms to induce and maintain participation, and offer support to prepare countries for participation.

Some of the institutions needed to support an IFCS program are similar to, but unique from, those needed for a carbon emissions mitigation regime. For example, as with an emissions regime, an IFCS program will need to develop a venue for negotiations. However, because there are more nations that are critical to an IFCS agreement, any IFCS negotiation venue will need to accommodate a large and more diverse set of actors. Also, as with a carbon emissions regime, the international community will need to develop mechanisms to monitor program performance, track allowances, and provide financing; but again, the nature of these activities changes when applied to the forest sector rather than the energy sector.

An IFCS program also presents some unique institutional requirements. Because forest carbon sinks are subject to fire and pestilence, with an IFCS agreement there is a much greater risk of catastrophic reversal of individual countries' contributions to mitigation than under an international emissions regime. The risk of reversal, combined with the decades-long nature of forestry investments, creates substantially heightened concerns of strategic withdrawal from a multilateral treaty and creates unique challenges related to countries making credible commitments.

There will be some common elements among the various IFCS choices before the UNFCCC. All programs will require data support and analysis for negotiating countries' participation. After countries negotiate the terms of participation, the program will need institutions to manage financial transactions, provide program oversight, measure and verify carbon stocks, resolve disputes, and take any necessary enforcement actions. Additional support may also be needed to ensure developing country readiness to enter into a program.²⁰

L.Q. 237, 263–66 (2010) (identifying REDD design elements and support services to reduce the risk of corruption in a REDD agreement).

20. Additional support services will be needed to assist individual countries with capacity development as needed to support a REDD program. National level services are

While all IFCS programs have common needs, particular IFCS programs will have particular needs. For example, a market-linked IFCS program will need extensive financial transaction support, while a fund-based program may require more support for inducing and maintaining countries' participation. These differences suggest not only different support service needs, but also different institutional options for delivery of these support services.

To explore how the specific design of an IFCS program influences the institutional requirements, this article will examine three possible IFCS models to identify the key services and institutions that will be needed to support a successful IFCS program. There are many conceivable IFCS design options; these are only three examples drawn from the many proposals, but should be sufficient to illustrate the range of institutional support needs. The three programs are: (1) a fund-based approach, proposed by Brazil (Brazil Proposal);²¹ (2) a market-based approach submitted jointly by several rainforest nations (Coalition Proposal);²² and (3) the Forest Program for Inventories of National Carbon (PINC) approach, which focuses on rewarding countries for increases in national carbon

beyond the scope of this paper. See generally Int'l Union for Conservation of Nature, *Legal Frameworks for REDD: Design and Implementation at the National Level* (John Costenbader ed., 2009), available at <http://data.iucn.org/dbtw-wpd/edocs/EPLP-077.pdf>; see also THE FOREST CARBON PARTNERSHIP FACILITY, <http://www.forestcarbonpartnership.org/fcp/> (last visited Feb. 17, 2012).

21. Brazil's proposal was one of the initial REDD proposals, and according to some commentators, is the "frontrunner" proposal following the recent climate change talks in Copenhagen. See *Climate Change and Brazil Deforestation*, UNITED PRESS INT'L (Dec. 11, 2009), http://www.upi.com/Science_News/Resource-Wars/2009/12/11/Climate-change-and-Brazil-deforestation/UPI-86931260550408/; see generally UNFCCC SBSTA, Item 5 of the Provisional Agenda, U.N. Doc. FCCC/SBSTA/2007/MISC.2 (Mar. 2, 2007), available at <http://unfccc.int/resource/docs/2007/sbsta/eng/misc02.pdf> [hereinafter Brazil Proposal].

22. This proposal builds on one of the first REDD proposals, which was jointly submitted by Papua New Guinea and Costa Rica. In addition to using a market approach to discourage emissions, this proposal includes two other options for developing country participation: a "readiness and capacity building" program and an "expanding implementation" program, which would allow countries to participate at incremental levels while building sufficient capacity to participate in the full program. This paper will focus on the market approach, which is the end goal of the program. See generally Ad Hoc Working Group on Long-term Cooperation, Reducing Emissions From Deforestation and Forest Degradation in Developing Countries; and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (2008), available at http://unfccc.int/files/kyoto_protocol/application/pdf/papuanewguinea190908.pdf [hereinafter Coalition Proposal]. The coalition members are Belize, Bolivia, Cameroon, Central African Republic, Costa Rica, Democratic Republic of Congo, Dominican Republic, Equatorial Guinea, Ghana, Guatemala, Guinea, Kenya, Lesotho, Liberia, Nicaragua, Panama, Pakistan, Papua New Guinea, Singapore, Solomon Islands, Thailand, Uganda, and Vanuatu. *Id.* at title page.

stocks.²³ While these three approaches share the same overall goal, they are structured in different ways and use different strategies. Similarly, their need for support services will also differ.

There are two primary differences that distinguish the proposals. First, while the Brazilian Proposal calls for funding via contributions from industrialized countries, the latter two are linked to the market for emissions allowances. Second, while both the Brazil Proposal model and the Coalition Proposal's REDD approach concentrate on emission reductions from deforestation and forest degradation in developing countries,²⁴ the PINC proposal expands the scope to include a full range of forest management activities and is open to both Annex I and non-Annex I countries.²⁵ These three different approaches were chosen for this article because they illustrate the range of possible approaches to REDD.

The design of institutions for a successful IFCS program will have to reflect a balance among several competing interests and constraints. A successful IFCS program must be supported by services and institutions that encourage cost-effective sequestration activities, minimize program transaction costs, maintain environmental effectiveness,²⁶ maximize the

23. See generally Andrew Plantinga & Kenneth Richards, *International Forest Carbon Sequestration in a Post-Kyoto Agreement*, in *POST-KYOTO INTERNATIONAL CLIMATE POLICY: IMPLEMENTING ARCHITECTURES FOR AGREEMENT* (Joseph E. Aldy & Robert N. Stavins eds. 2009) [hereinafter PINC proposal]. The national inventories approach to IFCS was first proposed in Andersson, K. & K. Richards, *Implementing an International Carbon Sequestration Program: Can the Leaky Sink Be Fixed?* *CLIMATE POLICY* 1: 73–88 (2001). See also K. Andersson, A. Plantinga & K. Richards, *The National Inventory Approach for International Forest Carbon Sequestration Management*, in *THE ECONOMICS AND POLITICS OF CLIMATE CHANGE* (Dieter Helm and Cameron Hepburn, eds. 2009).

24. The coalition approach would create fungible emissions reduction credits only for activities that reduce emissions in the forestry sector. The approach proposes rewarding countries for forest management and other activities that result in increased carbon stocks but does not provide details on how these changes in carbon stocks would be measured and rewarded or whether they would eventually be credited in an international carbon trading market. See Coalition Proposal, *supra* note 22, at 8–9.

25. Annex I nations are listed in the Appendix to the Kyoto Protocol and include countries that were considered “developed” at the time the Protocol was ratified. Non-Annex I nations refers to countries that were considered to be developing countries at the time the Convention was ratified. See UNFCCC, Convention Articles dated May 9, 1992, U.N. Doc. FCCC/INFORMAL/84 (1992), available at <http://unfccc.int/resource/docs/convkp/kpeng.pdf>. Annex 1 countries must meet emissions reduction goals that include emissions from greenhouse gas sources as well as the forestry sector. The Kyoto Protocol also allows Annex I nations to count domestic forest carbon sequestration toward emission reduction goals. See Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, U.N. Doc. FCCC/CP/1997/7/Add.1 at art. 3 (1998) [hereinafter Kyoto Protocol], available at <http://unfccc.int/resource/docs/convkp/kpeng.pdf>.

26. Here, effectiveness refers to a sequestration program's ability to achieve and maintain target levels of reductions in net carbon dioxide emissions through carbon sequestra-

program's political viability, and fit within the existing structure of international law. To achieve these goals, the provision of these services should be based upon the potential delivery options, the characteristics of each service, and the overall goals of the IFCS program.

For example, the support service of measuring carbon stocks might be provided by individual nations, private contractors, or by quasi-governmental international bodies.²⁷ Each party will approach the task with a different set of capabilities and incentives: individual nations have close proximity to data, but may be tempted to overestimate carbon stocks; private contractors may work quickly, but require extensive and costly contracting; international bodies may produce highly accurate data, but provide little transparency and raise controversial questions about national sovereignty. The relative weight of these advantages and disadvantages should be matched to the needs of the IFCS program. The effectiveness of some IFCS programs will depend upon measurement accuracy, while under others transparency or timeliness might be most necessary.²⁸ Because the different IFCS programs have different needs, the institutional arrangements that will be most successful will also differ, depending on the IFCS program that is ultimately chosen.

This article will discuss the importance of these key characteristics of the three models under Part II.B.1. It will also examine key considerations for organizing support institutions under an IFCS program. Since the international community has not yet chosen a specific IFCS option, this article will not recommend one set of support institutions over another. Instead, it will: (1) identify the key characteristics of the support services needed under each of three possible IFCS options; (2) suggest possible institutional arrangements for these support services, considering both existing and new institutional arrangements; and (3) discuss the key advantages, disadvantages, and tradeoffs of each arrangement.

In evaluating different arrangements, the authors sought institutions with three primary characteristics. First, the institutions should be effective and should support the environmental integrity of the IFCS program. Second, to the extent possible, the institutions should minimize transaction costs—whether in carrying out negotiations, executing transactions, monitoring performance, or settling disputes. Third, the choice of institutions must be politically and legally viable. Political support is important not only during the initial stages of IFCS policy development

tion. In short, effectiveness is the capacity of the program to deliver its claimed carbon dioxide benefits.

27. See discussion *infra* Part III. A.

28. See Krister Andersson et al., *National Forest Inventories: Policy Needs and Assessment Capacity*, 93 CLIMATIC CHANGE 69 (2009).

to ensure broad participation, but also during the implementation stage, when the parties will inevitably encounter unforeseen challenges and may need to commit to mid-course corrections to realize a successful program.²⁹ Legal viability, in turn, strengthens the long-term legitimacy of the IFCS program in the international community.

I. THREE MODELS FOR INTERNATIONAL FOREST CARBON SEQUESTRATION

In the Kyoto Protocol to the UNFCCC, developed countries (or Annex I Parties) committed to limit their national carbon emissions. These emissions reduction commitments include any carbon emissions from the forest sector, and forest carbon sequestration can be credited toward emission reduction commitments. For non-Annex I³⁰ countries, however, the Kyoto Protocol provides only a limited incentive to improve forest carbon sequestration. Non-Annex I Parties may host afforestation and reforestation projects through the Kyoto Protocol's Clean Development Mechanism (CDM).³¹ Projects that effectively sequester carbon dioxide are rewarded with Certified Emissions Credits (CER), which can be sold to Annex I countries and counted toward Kyoto Protocol emissions reduction obligations.³² Because the CERs are awarded to the CDM project developers, however, rather than directly to the host nations, the credits provide only an indirect incentive for host countries

29. See, e.g., ELINOR OSTROM, GOVERNING THE COMMONS 212–13 (1990) (discussing the importance of legal and political regimes in providing oversight and support as institutions governing common-pool resources adapt to changed conditions).

30. Non-Annex I countries are exempt from certain obligations under the UNFCCC, including emissions reduction targets under the Kyoto Protocol. See Kyoto Protocol, *supra* note 25. As a result, the term now encompasses countries like China and India, which have undergone major economic growth, countries like Costa Rica and Venezuela, which have undergone moderate economic growth, and countries like Rwanda and Bangladesh, which are classified by the UN as “least developed countries.” See UN OFFICE OF THE HIGH REPRESENTATIVE FOR THE LEAST DEVELOPED COUNTRIES, LANDLOCKED DEVELOPING COUNTRIES AND SMALL ISLAND DEVELOPING STATES, <http://www.unohrrls.org/en/ldc/related/62/> (last visited Feb. 17, 2012). In this paper, we use the term “Annex I” or “non-Annex I” to refer to countries’ UNFCCC obligations rather than countries’ development status.

31. See Kyoto Protocol, *supra* note 25, at art. 12.

32. See Kyoto Protocol, *supra* note 25, at art. 12. CERs from CDM forestry projects are not considered permanent, however, due to the risk that fire or other disturbances may later return the sequestered carbon to the atmosphere. Instead, forestry CDM projects generate temporary CERs (tCERs), which expire after a specified period of time and may be replaced only if through re-verification of the project. Annex I countries cannot use expired tCERs to meet their Kyoto Protocol obligations. See TILL NEEF & SABINE HENDERS, GUIDEBOOK TO MARKETS AND COMMERCIALIZATION OF FORESTRY CDM PROJECTS 8–9 (2007).

to participate in the CDM.³³ An approach that awarded credits directly to national governments would likely provide a stronger incentive for non-Annex I forest countries to adopt broad laws and programs, and this in turn might increase forest carbon sequestration more effectively than the individual projects that are credited under the CDM.

The CDM is also limited in scope and extent. It does not address emissions from deforestation and degradation, and it rewards a small number of forest carbon sequestration activities on a project-by-project basis.³⁴ The REDD proposals before the UNFCCC, as well as similar IFCS proposals from environmental organizations, academics, and public policy think tanks, seek to bring non-Annex I forest activities under the umbrella of the UNFCCC. This article has selected three plausible IFCS models that illustrate the range of support service needs within each of the three different approaches. The following subsections provide a brief description of each IFCS model.

A. The Brazil Proposal

Brazil has proposed a voluntary, fund-based approach to IFCS. Under this approach, developing nations that demonstrate they have reduced deforestation rates are provided with *ex post* financial payments, equivalent to an avoided emissions price per ton as set in *ex ante* negotiations.³⁵ A reference emissions rate from deforestation is established, based on historic deforestation rates. The reference rate is compared with actual emissions in the current year.³⁶ If emissions decrease, the country is rewarded with payments contributed to the UNFCCC from Annex I nations. If emissions increase, the difference between reference and actual emissions is debited from that country's future rewards.³⁷ The proposal calls for emissions reductions to be measured via "a transparent and credible system that reliably provides estimates of the annual emissions from deforestation, by biome."³⁸

33. Project developers must receive permission from the host government before proceeding with the CDM project. See Kyoto Protocol, *supra* note 25, at art. 12. This ensures that the project is consistent with the host country's interests, and provides the host country with an opportunity to negotiate favorable terms for the project.

34. See generally Michael Wara, *Measuring the Clean Development Mechanism's Performance and Potential*, 55 UCLA L. REV. 1759 (2008) (giving an overview of the shortcomings of the CDM).

35. See Brazil Proposal, *supra* note 21, at 22–23.

36. See Brazil Proposal, *supra* note 21, at 23–24.

37. See Brazil Proposal, *supra* note 21, at 22.

38. Brazil Proposal, *supra* note 21, at 23.

B. The Coalition Proposal

In contrast to the Brazil Proposal, the Coalition Proposal links forest emissions to the broader international carbon market, allowing Annex I nations to use forest carbon credits to meet their reduction commitments under the Kyoto Protocol or its successors. Like the Brazil Proposal, the Coalition Proposal's REDD approach rewards countries that reduce rates of emissions from deforestation and degradation below a historic reference emissions rate.³⁹ Instead of a set payment per ton of carbon avoided, however, the Coalition Proposal would create "emissions reductions units," fully fungible with credits used by Annex I parties to meet their Kyoto obligations.⁴⁰

In addition to rewarding decreased deforestation and degradation, the Coalition Proposal seeks to provide an incentive for countries to increase forest stocks through activities such as afforestation and forest management.⁴¹ The Coalition Proposal does not, however, describe how these increases would be measured, or whether these activities would generate fungible carbon credits.⁴² Further, this proposal also stresses the need to provide adequate incentives to countries with a wide range of circumstances, and allows the use of "an appropriate development adjustment factor when assessing reference emissions levels."⁴³ It also calls for Annex I Parties to agree to "deeper emissions reductions" to ensure that IFCS is supported by adequate demand for credits.⁴⁴

C. The PINC Approach

A third policy option is the Forest Program for Inventories of National Carbon (PINC). Like the Coalition Proposal, PINC rewards countries by allowing them to generate forest emissions credits that can be traded on the international carbon market. Unlike the other proposals, however, PINC rewards countries for changes in forest carbon stocks rather than changes in rates of deforestation.⁴⁵ This establishes a program with broad sectoral coverage that rewards countries not only for slowing rates of deforestation, but also for expanding existing forest carbon

39. Coalition Proposal, *supra* note 22, at 5–6.

40. Coalition Proposal, *supra* note 22, at 6.

41. See Coalition Proposal, *supra* note 22, at 9.

42. See Coalition Proposal, *supra* note 22, at 9.

43. Coalition Proposal, *supra* note 22, at 6. Development adjustment factors can include a wide range of information, including information about a country's economic development needs, social conditions, and environmental conditions.

44. Coalition Proposal, *supra* note 22, at 7.

45. See PINC proposal, *supra* note 23. Of course, changes in carbon stocks can be translated to changes in carbon flows.

stocks through any number of modifications to forest policy and practice. The PINC model also does not differentiate between natural and human-induced changes—it considers only absolute changes in forest carbon stocks. This necessarily shifts the risk of intentional or natural losses in carbon stocks to the participants themselves. Finally, the PINC program encourages all nations to participate, not just developing countries, and evaluates carbon stock changes in all countries equally.⁴⁶

Like the Coalition Proposal, the forest PINC approach recognizes that countries will enter a forest carbon agreement with different needs and circumstances. To accommodate these differences, the PINC approach allows nations to negotiate a reference carbon stock level, thus allowing nations with historically high deforestation rates to negotiate a more favorable reference stock to induce their participation in the program. Unlike the Coalition Proposal approach, however, if such negotiations “create” forest carbon credits as an inducement to participation,⁴⁷ the PINC program would require Annex I nations to increase their emissions reduction commitments by a corresponding amount.⁴⁸ By allowing countries to negotiate explicitly for more favorable reference level stocks, the PINC approach separates the highly political negotiation process from the technical aspects of actual reference stock measurement.

II. INSTITUTIONS TO SUPPORT NEGOTIATION

To develop a successful, broadly accepted IFCS regime, it will be critical for the international community to provide institutions to support the negotiation process. There are two distinct phases to any IFCS negotiation. In the first phase, the international community will negotiate a framework for IFCS, possibly one of the three models discussed in this paper or a variation of one of the models. The UNFCCC currently provides a formal channel for these programmatic negotiations. Under the UNFCCC framework, a wide range of participants (including NGOs, consultants, and international UN organizations) provide the UNFCCC Parties with information and analysis. The parties to the treaty also negotiate the details of programs and treaty modifications.⁴⁹ The current ap-

46. Most REDD proposals restrict the program to developing nations only while Annex I nations are currently allowed credits for forest and land-use activities under Art. 3.3 and 3.4 of the Kyoto Protocol. Kyoto Protocol, *supra* note 25, at Art. 3.3, 3.4.

47. Often informally referred to as “hot air.”

48. See PINC Proposal, *supra* note 23, at 696.

49. See, e.g., Chiara Giorgetti, *From Rio to Kyoto: A Study of the Involvement of Non-Governmental Organizations in the Negotiations on Climate Change*, 7 N.Y.U. ENVTL. L.J. 201 (1999).

proach requires consensus or near-consensus by the COP.⁵⁰ If the COP reaches consensus on an IFCS program, it will become part of the UNFCCC treaty and implemented by the UNFCCC Secretariat.

Some IFCS programs will also require a second phase of negotiations, in which individual nations negotiate the terms of their participation in the program. This is an explicit part of the PINC approach,⁵¹ which requires forest nations to negotiate starting reference stocks, and an implicit part of the Coalition Proposal (Coalition), which allows countries to modify initial baseline emission levels according to individual “development adjustment factors.”⁵² These negotiations need to be made concurrently with other aspects of the IFCS approach that indicate the degree of long-term commitment to the IFCS program. For example, under the Coalition and PINC approaches, developed countries may be called upon to commit to additional emissions reductions concurrent with developing countries’ entry into the system.⁵³ The Brazil fund-based approach will likely require less second-phase negotiations, since individual nations need not negotiate reference stocks or development factors. However, some process will need to be used to determine each country’s avoided emissions from deforestation before credits can be transferred, and under a fund-based approach the international community will nonetheless need to negotiate a carbon price and mechanisms for donor countries to make long-term commitments to fund the IFCS gains of participants.⁵⁴

In addition to the problem of transaction costs and political viability, the negotiation process is characterized by technical complexity. For countries to effectively negotiate beneficial terms of the arrangement and their participation in an IFCS program, they need access to a wide range of information about the technical nature of forest carbon stock and flow

50. The recent Cancun agreement was a departure from UNFCCC practice in that the COP formally adopted the decision despite the lack of full consensus—one party, Bolivia, formally objected to the Agreement. See EARTH NEGOTIATIONS BULLETIN, INTERNATIONAL INSTITUTE FOR SUSTAINABLE DEVELOPMENT, 1 (Dec. 13, 2010), available at <http://www.iisd.ca/download/pdf/enb12498e.pdf>. The UNFCCC has never adopted official rules of procedure. See United Nations Framework Convention on Climate, Geneva, Switz., July 8–19, 1996, *Organizational Matters: Adoption of the Rules of Procedure*, Rule 42, U.N. Doc. FCCC/CP/1996/2 (May 22, 1996), available at <http://unfccc.int/resource/docs/cop2/02.pdf> (describing two alternative approaches for UNFCCC decision-making). UNFCCC custom has been to adopt formal decisions by consensus. See Dan Bodansky, *The Copenhagen Climate Change Conference: A Post-Mortem* 8 (2010) (unpublished manuscript), <http://ssrn.com/abstract=1553167> (last visited Feb. 12, 2012).

51. See PINC Proposal, *supra* note 23, at 6.

52. See Coalition Proposal, *supra* note 22, at 6.

53. See *supra* notes 23, 26, 27, 28 and accompanying text.

54. See Brazil Proposal, *supra* note 21.

assessment methods, the challenges associated with developing effective domestic forest policies, and the impacts on other political and trade agreements. All countries need to enter into negotiations armed with objective and reliable information to support the negotiation process.

The following subsections of this article will examine two aspects of the negotiation process. Part II.A will examine the choice of negotiation venues and participants in light of the tension between transaction costs on the one hand and political and legal viability on the other hand. Part II.B will discuss the information needs and options for providing information to participants in the negotiation process.

A. Platforms for Negotiation

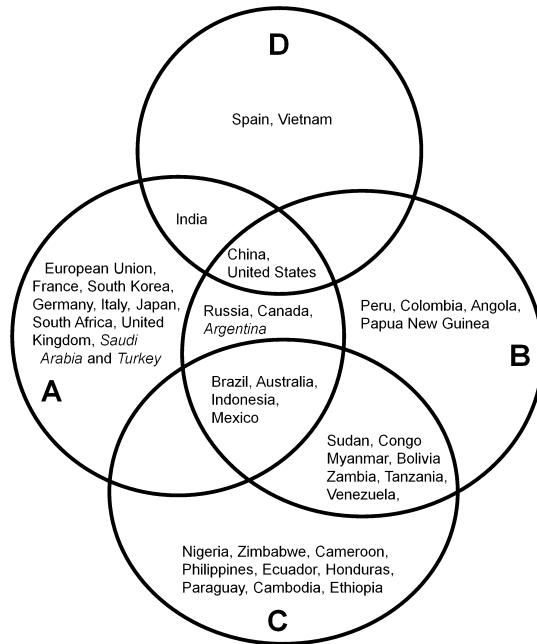


Figure 1: Relation of G20 Countries to Countries with Greatest Forestland Area, Forest Area Losses, and Forest Area Gains

(KEY: A—G20 members [countries that are not also members of the Major Economies Forum are set in *italics*]; B—countries holding 80 percent of world's forests; C—countries contributing 80 percent of the world's forest losses, 1990–2007; D—countries contributing 80 percent of the world's forest gains, 1990–2007).⁵⁵

The first step for the international community to develop an IFCS program is to identify an appropriate platform or venue for the negotia-

55. *Infra.* note 64.

tions. In climate negotiations, the large number of UNFCCC parties can create a tension between transaction costs and political viability during the negotiation process. Inclusion of all parties is necessary for political viability, but negotiating and coming to consensus with such a large and diverse number of participants costs a significant amount of time and money. Several observers have underscored the inherent problems with negotiations involving large numbers of participants.⁵⁶ UNFCCC decisions are customarily adopted by consensus,⁵⁷ which allows individual nations or small groups of nations to bar agreements and increases the transaction costs of negotiating an agreement.⁵⁸

The negotiations at the 15th COP meeting in Copenhagen illustrate the tension between transaction costs and political viability. Negotiations among the full COP stalled, and the Copenhagen talks resulted in an agreement only when a smaller number of parties entered into last-minute negotiations, producing the Copenhagen Accord (Accord).⁵⁹ A small group of nations successfully blocked formal adoption of the Accord on the grounds that the process used to create the Accord was flawed.⁶⁰ Instead, a majority of the parties “took note” of the Accord.⁶¹

56. “The UNFCCC process involves too many countries to allow anything of real significance to be achieved. The larger the number of parties that are included in a negotiation, the larger the transactions costs incurred in reaching agreement.” ROBERT STAVINS, *OPTIONS FOR THE INSTITUTIONAL VENUE FOR INTERNATIONAL CLIMATE CHANGE*, 2 (2010); see also SARAH O. LADISLAW, *A POST-COPENHAGEN PATHWAY 5* (2010), available at http://csis.org/files/publication/100111_Ladislaw_Post_copenhagen.pdf (noting that “[t]he United Nations has never been the ideal place to conduct global negotiations. It is large, unwieldy, and full of very easy ways to deter progress on any given issue.”); see also Dan Bodansky, *The Illegitimacy of Legitimacy*, *OPINIO JURIS*, (Dec. 17, 2009), <http://opiniojuris.org/2009/12/17/the-illegitimacy-of-%E2%80%9Clegitimacy/>.

57. Consensus here is defined by a lack of formal objection. See Bodansky, *supra* note 50, at 8. The Cancun Agreement, however, was adopted by near-consensus over the objection of a single party. See *id.* It is not yet clear whether consensus or near-consensus will be used in future UNFCCC proceedings.

58. See, e.g., David Doniger, *The Copenhagen Accord: A Big Step Forward*, SWITCHBOARD: NATURAL RESOURCES DEFENSE COUNCIL BLOG (Dec. 21, 2009), available at http://www.svet.lu.se/uploads/kurser/ht2010/resurser/ht2010_STVP01_svet-mha_10.pdf (last visited May 1, 2012) (describing the last-minute negotiations at COP-15 in Copenhagen and explaining that parties with substantive objections and parties with obstructionist motives both contributed to the UNFCCC’s decision to take note of the Accord rather than formally adopt it).

59. The Copenhagen Accord was negotiated by 29 nations and included representatives of the major developing country negotiation blocks, such as AOSIS, the African Union, the LDCs, the Coalition of Rainforest Countries, and the G-77. However, the final breakthrough on the agreement came during a much smaller meeting that was limited to heads of state of the United States, China, India, Brazil, and South Africa. See Bodansky *supra* note 50, at 5.

60. *Id.* at 8.

Deviating from the customary consensus procedure in this way produced an agreement, but at the expense of both political and legal viability. Several developing countries rejected the Accord, objecting to the procedure used to develop it, which excluded most parties from the final negotiations.⁶² Because of objections to the Accord, the COP was only able to “take note” of the agreement, rather than formally adopt it. The political objections to the Accord and its negotiation process diminished somewhat in the months following Copenhagen, as several countries that had initially objected to the agreement later submitted emission reduction commitments under the Accord framework. Because the Accord was not formally adopted, however, the legal status of these commitments was unclear, leading to confusion about whether the commitments would be binding on parties and what kind of recourse the international community might have if parties failed to honor their commitments.⁶³

Unlike most of the other support services, the initial programmatic negotiation cannot be tailored to a particular IFCS model—the negotiation process itself will determine which IFCS model is chosen. Accordingly, the considerations for the initial choice of negotiation platform will be the same for any IFCS negotiation. The ideal negotiation forum will support effectiveness and political viability at minimal transaction costs by including all necessary parties, minimizing the number of total negotiating parties, and providing a neutral negotiation forum. As the Accord illustrates, the legal status of the negotiation forum may also be important. If the results of the negotiation must be legally binding on all UNFCCC parties, the negotiation will need to either occur within the UNFCCC itself, or through another forum that has been sanctioned by the COP. However, for negotiations that need not be legally binding, or for an IFCS program that does not require participation by all UNFCCC parties, other forums may be appropriate.

Accordingly, the first step in supporting IFCS negotiations will be to identify the necessary participants to the negotiations. The COP 15—

61. United Nations Framework Convention on Climate Change, Dec. 7–19, 2009, *Report of the Conference to the Parties on its 15th Session*, 4, U.N. Doc. FCCC/CP/2009/11/Add.1 (Mar. 30, 2010).

62. Sudan, Venezuela, Bolivia, and Nicaragua were among the countries that refused to adopt the Accord, “arguing that the negotiation of the Copenhagen Accord by a smaller group represented a ‘coup d’état’ against the United Nations because it bypassed the formal meetings.” Dan Bodansky, *The Copenhagen Climate Change Accord*, *INSIGHTS* (The American Society of International Law), Feb. 12, 2010, available at <http://www.asil.org/files/insight100212pdf.pdf>. See also Doniger, *supra* note 58.

63. See, e.g., Lavanya Rajamani, *Neither Fish Nor Fowl*, 606 *SEMINAR*, Feb. 2010, at 26–29, available at http://www.india-seminar.com/2010/606/606_lavanya_rajamani.htm.

the 15th session of the Conference of the Parties—has illustrated the high transaction cost of negotiating with all 194 parties to the UNFCCC. However, it may be possible to limit the number of countries directly involved in the IFCS negotiations. Of the 194 parties to the UNFCCC, just 21 are responsible for 80 percent of global greenhouse gas emissions.⁶⁴ Similarly, in 2007, 80 percent of the world's forests were located in just 21 countries.⁶⁵ This would suggest that a subset of parties could work out the broad elements of an agreement and then invite other countries to participate.

There are several potential alternatives to the UNFCCC as a negotiation forum. Several commentators have suggested that alternative forums, such as the Major Economies Forum (MEF) and the Group of 20 (G-20), might be appropriate negotiation platforms for an IFCS program because they involve nearly all of the key players that would need to be part of forest carbon negotiations, but have fewer members than the UNFCCC, making the negotiation process easier.⁶⁶ The MEF involves 16 countries plus the European Union and regions that account for roughly 80 percent of global greenhouse gas emissions.⁶⁷ The G-20 includes the same 17 participants plus Argentina, Saudi Arabia, and Turkey.⁶⁸ While both of these options would reduce transaction costs significantly relative to the UNFCCC, neither of these is likely to prove particularly effective.

64. For 2007, the countries are, in order of decreasing level of national annual emissions: China, United States, Italy, France, India, Russian Federation, Japan, Germany, Canada, United Kingdom, Republic of Korea, Iran, Mexico, South Africa, Saudi Arabia. See United Nations, Department of Economic and Social Affairs, *Carbon Dioxide Emissions (CO₂), Thousand Metric Tons of CO₂*, MILLENIUM DEVELOPMENT GOALS INDICATORS (July 7, 2011), <http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=749&crd>.

65. See *Percentage of Land Area Covered by Forests*, Environmental Indicators, UNITED NATIONS STATISTICS DIVISION (Dec. 2010), <http://unstats.un.org/unsd/environment/forestarea.htm>. The 21 countries, from largest to smallest forest areas, are: Russia, Brazil, Canada, United States, China, Australia, Congo, Indonesia, Peru, India, Sudan, Mexico, Columbia, Angola, Bolivia, Venezuela, Zambia, Tanzania, Argentina, Myanmar, and Papua New Guinea.

66. The MEF and the G-20 are groups that meet regularly to discuss and address problems of importance to the global economy; both groups include members from both developed and developing countries. These features make them potentially useful as forums for negotiating agreements on climate change. See, e.g., Ladislav, *supra* note 56, at 6; see also DAN BODANSKY, *THE INTERNATIONAL CLIMATE CHANGE REGIME: THE ROAD FROM COPENHAGEN*, 5 (2010), available at <http://belfercenter.ksg.harvard.edu/files/Bodansky-VP-October-2010-3.pdf>.

67. See LADISLAW, *supra* note 56, at 7. The participants include Australia, Brazil, Canada, China, the European Union, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, South Africa, the United Kingdom, and the United States.

68. See LADISLAW, *supra* note 56, at 7.

tive for an IFCS negotiation because they do not include several countries with the greatest forest areas.⁶⁹

The international community will also have to be careful not to oversimplify the assessment of key participating countries. Certainly, the absolute number of acres in forests is one measure of a country's potential involvement in an IFCS program. But the list of 21 countries with the greatest forest acreage does not include, for example, Sweden and Finland, two countries with major industrial forest activities and a great deal of technical expertise in the field. Nor does the list include a number of countries from Africa (Nigeria, Zimbabwe, Cameroon, and Ethiopia), Asia (Philippines and Cambodia) and Latin America (Ecuador, Honduras, and Paraguay) that lie in the top 21 countries for loss of forestry area from 1990 to 2007.⁷⁰ Finally, four countries, China, the United States, Vietnam, and Spain, account for over 80 percent of the newly established forest acreage from 1990 to 2007, and the latter two are not included in any of the previous categories.⁷¹

As indicated by Figure 1, there are 42 nations (plus the European Union) that fall in one or more of the key categories of (1) G-20, (2) greatest total forest area, (3) greatest forest areas losses, and (4) greatest forest area gains. It is important that the choice of institutions accommodate the full range of relevant forest nations. In the case of either the Brazilian or the REDD approach, each of which focuses on deforestation, the G-20 donor (or allowance consuming) countries and the countries with the greatest forest losses are key constituents (Figure 1, groups A and C). For the PINC model, there will be a larger group of countries with an interest, including those making substantial forest area gains (group D) and those with substantial forest area (group B).

Moreover, limiting the number of participants could have negative consequences on political and legal viability if nations object to being excluded from the process and refuse to sign on, as occurred with the Accord.⁷² The political viability problem might be addressed by allowing

69. Specifically the G-20 does not include Congo, Peru, Sudan, Columbia, Angola, Bolivia, Venezuela, Zambia, Tanzania, Myanmar, and Papua New Guinea.

70. The G-20 does not include the following nations that are among the 21 countries with the greatest loss of forest area from 1990 to 2007: Sudan, Myanmar, Zambia, Congo, Nigeria, Zimbabwe, Tanzania, Venezuela, Bolivia, Cameroon, Phillipines, Ecuador, Honduras, Parguay, Cambodia, and Ethiopia.

71. Remarkably, gains in China forest area are almost identical in magnitude to Brazil's losses. From 2000 to 2005, China added 3,209 (thousand hectares) of forest while Brazil lost 3,090. From 2005–2010, China added 2,763 and Brazil lost 2,194. FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, GLOBAL FOREST RESOURCES ASSESSMENT 2010, GLOBAL TABLES, TABLE 3 (2010), available at <http://www.fao.org/forestry/fra/fra2010/en/>.

72. The political fallout from the Accord may be limited, as many of its provisions were formally adopted in the Cancun Agreement. See Andrew Holland, *Climate Agreement*

individual countries to be represented by coalitions, thus assuring that all members are represented in the negotiations, even though the number of negotiating parties is limited. This approach will only be successful, however, if representatives of key coalitions of nations are included in all negotiations and given a full opportunity to shape any agreement.

It may also be beneficial to use non-parties, such as World Bank institutions, to facilitate the negotiations.⁷³ The Coalition approach suggests “leveraging the [World Bank Forest Carbon Partnership Facility] Participant’s Committee into an international ‘*Institutional REDD Platform*’ for developing countries, donors, international agencies. . .to better coordinate, evaluate and reach consensus related to activities, standards and performance.”⁷⁴ Such an approach would take advantage of the World Bank’s current and ongoing IFCS implementation research, which could bring useful information into the negotiation process.⁷⁵ It would also bring in a wider range of parties to the IFCS negotiations, which could be useful for IFCS approaches that involve emissions trading, which might benefit from including representatives from banking and insurance industries in the negotiations.

This approach, however, could also come at the expense of neutrality if the World Bank’s existing work is seen as more favorable to

in Cancun: Important Progress, but Difficult Questions Remain Unanswered, INTERNATIONAL INSTITUTE FOR STRATEGIC STUDIES, <http://www.iiss.org/whats-new/iiss-voices/climate-agreement-in-cancun-important-progress-but-difficult-questions-remain-unanswered/> (last visited Feb. 17, 2012) (stating that “[t]he Cancun agreement essentially adopts the Copenhagen Accord, including the emission mitigation targets voluntarily submitted by approximately 80 countries and the measuring, reporting, and verification compromise agreements. . . . The Cancun Agreements successfully brought the Copenhagen Accord into the UNFCCC negotiating process.”). However, the same might not be true for an agreement negotiated outside the UNFCCC entirely. *Id.*

73. Climate change policies already have an effect on many countries’ economic and trade policies, and this effect will only increase with the addition of a large-scale international forest carbon sequestration program. John Whalley & Sean Walsh observe that “[t]here is no reason why climate change negotiations should not only focus on the mitigation elements of the post-Bali Roadmap, but also on burden-sharing and the distributional implications of climate change initiatives.” John Whalley and Sean Walsh, *Bringing the Copenhagen Climate Change Negotiations to Conclusion*, 55 CESIFO ECON. STUD. 255, 265 (2009), available at http://www.cesifo-group.de/pls/guestci/download/CESifo%20Working%20Papers%202008/CESifo%20Working%20Papers%20November%202008%20/cesifo1_wp2458.pdf. As climate change negotiations come to include far-reaching questions about economic policy, trade policy, and distributional effects, institutions such as the World Bank may have an increasingly important role to play in the negotiations.

74. Coalition Proposal, *supra* note 22, at 3.

75. The World Bank’s Global Carbon Partnership Facility has been engaged in demonstration projects and capacity building activities needed to support a REDD program. See generally THE FOREST CARBON PARTNERSHIP FACILITY, <http://www.forestcarbonpartnership.org/fcp/> (last visited Mar. 2, 2012).

some parties than others. Industrialized countries tend to place more trust in World Bank and its institutions than do the developing countries, which tend to prefer UN units such as the UNFCCC or the UN Forest and Agriculture Organization (FAO), which operate by consensus.⁷⁶ Under a forest carbon agreement, however, developing nations will play a much more active role, since they control much of the world's forests. Indeed, most of the REDD proposals are aimed exclusively at forests in the developing world. Selection of a neutral forum may be crucial to building trust between developed and developing nations and encouraging negotiation toward a mutually beneficial IFCS program.

In addition, agreements made outside the UNFCCC are not legally binding on UNFCCC members not part of the outside agreement.⁷⁷ This does not necessarily diminish the usefulness of a non-UNFCCC institution as a negotiation forum. Some IFCS programs may not need the legal formality of a formal UNFCCC agreement to be successful. The current work of the World Bank, for example, shows that forest carbon sequestration efforts need not be part of an international treaty, provided that each participant has made a sufficiently credible commitment to follow through on promises to fund, administer, or implement the required activities.⁷⁸ However, if an IFCS program is closely intertwined with a broader international carbon emissions agreement, the negotiation forum

76. See, e.g., R. William Gardner, Note, *The Fight for Clean Technology Funds: Who Should Control the Future of Low-Carbon Technology in the Developing World?* 18 IND. J. OF GLOBAL LEG. STUD. 487-98 (2011).

77. Countries are bound to the terms of treaties or other agreements only if they express a willingness to be bound by "signature, exchange of instruments constituting a treaty, ratification, acceptance, approval or accession, or by any other means if so agreed." United Nations Vienna Convention on the Law of Treaties, Article 11, May 23, 1969, 1155 U.N.T.S. 331.

78. The World Bank's Forest Carbon Partnership Facility (FCPF) mobilizes donor funding to assist developing countries in reducing emissions from deforestation and degradation. See *2011 Annual Report*, FOREST CARBON PARTNERSHIP FACILITY, available at http://www.forestcarbonpartnership.org/fcp/sites/forestcarbonpartnership.org/files/Documents/PDF/Oct2011/FCPF_Carbon_AR_FINAL_10_3.pdf. Much of the FCPF's initial work has focused on helping developing countries prepare for an eventual REDD or REDD+ agreement, and Readiness Preparation grants totaling nearly U.S. \$65 million have been distributed to 18 developing countries. *Id.* at 7. In 2011, the FCPF operationalized its Carbon Fund, which will provide payments to countries that have entered into an Emission Reductions Payment Agreement (ERPA) through the FCPF. *Id.* at 33. As of June 2011, developed country governments had pledged or committed U.S. \$212 million to the Carbon Fund. The FCPF plans to sign at least three ERPAs by 2014. *Id.* at 11. This work on developing a REDD+ program has taken place entirely outside the official channels of the UNFCCC. However, its actual success will depend upon the developing countries fulfilling the terms of their ERPAs, developed countries actually providing the funds they have committed, and the FCPF continuing to administer the program.

may need to ultimately lead to approval under the UNFCCC consensus process. This could occur if negotiations take place within the UNFCCC itself, or if UNFCCC parties delegate the negotiation process to an alternative forum and agree to be bound by the results of that negotiation.⁷⁹ It could also occur if a negotiation forum limits the number of participants to reduce transaction costs, but later obtain formal UNFCCC approval.

It is not clear that any of these existing models is the superior choice of negotiation platforms. A negotiation platform need not be built on an existing institution, but could be created solely for IFCS negotiations, perhaps as a negotiation committee, workgroup, or independent entity responsible for bringing parties together to negotiate. To assure that the critical countries are included even as the number of participants is limited, it might be necessary to develop a new multilateral organization comprising the countries that are most likely to be participants in the IFCS program, both as suppliers of sequestration services and as purchasers of the allowances. Such an institution could be selected for neutrality by including representatives from nations with divergent interests. However, creation of new institutions—and in particular, creation of new institutional rules—is costly and time-consuming, and should only be undertaken if the benefits of the new forum relative to the existing forum choices outweigh the costs of creating the new institutions.

It is important to recognize that negotiations regarding continuing adaptation of the IFCS program may have different institutional needs than the initial programmatic negotiations. Once an IFCS program is adopted, ongoing negotiations are likely to focus on aspects of forest carbon management and measurement, which presumably would be centered around scientific and technical issues, rather than political issues. This suggests that while the UNFCCC or a similarly neutral negotiation platform might be needed initially, subsequent negotiations could be hosted by think tanks, university consortia, or other institutions known for their technical expertise rather than their neutrality. Similarly, the actors representing parties at these discussions could be individuals with scientific, technical, or policy expertise, rather than those with political or legal expertise (as is normal at most international environmental law negotiations).

79. For example, the UNFCCC has delegated responsibility for administering the Kyoto Protocol's Adaptation Fund to the World Bank's Global Environment Facility (GEF) and a separate Adaptation Fund Board. See *Adaptation Fund*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (Feb. 15, 2012) http://unfccc.int/cooperation_and_support/financial_mechanism/adaptation_fund/items/3659.php.

Finally, if negotiations will become a regularly recurring part of an IFCS program, there may be significant advantages to be gained from creating an institution designed primarily for the purpose of IFCS negotiations. If negotiations are one-time occurrences, however, the costs of creating new negotiation institutions may outweigh these benefits.

B. Information Support for Negotiations

During the initial negotiations to select and design a particular IFCS program, countries will need neutral, transparent, accurate, and accessible information and analysis about the expected benefits, costs, and risks of the IFCS program. Countries will also need information about how those costs and benefits will be distributed among different countries and different groups within countries.⁸⁰

Some of this information is provided within the UNFCCC process itself. For example, the SBSTA researches technical issues, including mitigation alternatives and options to reduce emissions from deforestation and degradation.⁸¹ SBSTA's mandate is to provide the COP with advice about technical matters, to promote development and transfer of technologies, and to develop methodological guidelines on matters such as measuring and reporting greenhouse gas emissions.⁸² It is not designed, however, to measure aggregate costs and benefits of different policy approaches, nor to provide countries with information about how those costs and benefits will be distributed.

A similar group, the Subsidiary Body on Implementation (SBI), advises the COP on matters related to implementation of the Convention.⁸³ It reviews communications from the parties to assess the Convention's overall effectiveness and provides guidance on the Convention's efforts to assist non-Annex I parties meet Convention obligations such as reporting greenhouse gas emissions.⁸⁴ However, this group's focus is on ex-post advice about the Convention implementation, rather than assessment and analysis of how effectiveness might differ under different policy options.

80. See, e.g., Lai-Huat Lim & Izak Benbasat, *A Theoretical Perspective of Negotiation Support Systems*, 9 J. MANAGEMENT INF. SYSTEMS 27, 32–36 (1992) (explaining how computers can be used to assist negotiators with information and analysis in complex negotiations).

81. See *Convention Bodies*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, available at http://unfccc.int/essential_background/convention/convention_bodies/items/2629.php (last visited Feb. 18, 2012) [hereinafter *Convention Bodies*].

82. *Id.*

83. *Id.*

84. *Id.*

Parties may receive information about costs, benefits, and distributional effects of different IFCS options from a wide range of think tanks and environmental organizations that are routinely involved in UNFCCC meetings and negotiations. Numerous organizations, including the World Bank, academic groups, and environmental NGOs provide information to parties. The UNFCCC facilitates this process by providing meeting spaces for such groups to present “side events” to the parties during UNFCCC meetings. These groups’ goals are usually to inform the parties about the urgency of particular aspects of climate change as well as the benefits of particular policy approaches. This information is often useful, but it is rarely designed to be objective.

A final source of information for the parties is private consulting firms. They often provide country-specific analysis on the potential costs and benefits of different climate change policies.⁸⁵ However, access to use of these private sources of information may be conditional upon countries’ ability and willingness to pay for these services, thus limiting access for those who cannot or choose not to pay for these services.

Once the design of the IFCS program is determined, many of the individual countries will require information to help them decide whether to participate in the program and on what terms. This information should include an assessment of current national carbon stocks, past forest trends, projected future trends, and the extent of opportunities to influence the direction of future stocks and flows of forest carbon. Potential participants will also need access to information about the expected future costs and benefits—economic, political, social, and environmental—of participation in the IFCS program, as well as information about the risks involved. Moreover, because the negotiations about carbon price (in the case of the Brazil Proposal) and baselines (for all approaches) are multilateral in nature, each country might want similar information about other participants in the program. This information is a crucial starting point for negotiations, because it will help all parties understand what each nation stands to gain from the program, as well as the opportunities each must forego by participating.

Parties will also need information about the IFCS program itself—about the other parties’ commitments, the extent of funding likely to be available for forest carbon activities, the validity of measurement, verification, and compliance monitoring programs, the expected price of emissions allowances, and the interaction with any other carbon agreements. Countries are unlikely to negotiate participation and invest resources un-

85. See, e.g., McKinsey & Co., *ASSESSMENT OF GREENHOUSE GAS EMISSIONS ABATEMENT POTENTIAL IN POLAND BY 2030* (2009), available at http://www.mckinsey.com/locations/Warsaw/files/pdf/Raport_Full_EN.pdf.

less they are convinced that other parties will also be compelled to honor their commitments.⁸⁶ This may be even more significant with a forest carbon agreement, where the ultimate effectiveness of the program requires other parties' honoring their commitments. In addition, a forest carbon program that does not include a majority of the forest nations risks the problem of leakage, in which deforestation activities migrate outside the program area and threaten to undermine the carbon benefits achieved by participating nations.

To adequately support the negotiation process, these information services must be characterized by trustworthiness. The information must be reasonably accurate and its preparation must be transparent. It must also be seen as neutral—that is, the parties gathering and analyzing information should not have any particular interest in the outcome of the negotiation. The information must also be accessible to all parties—made freely available in formats and languages that all parties can access.

1. Information Needs Under the Three Models

The key characteristics of information services—neutrality, transparency, accuracy, and accessibility—must be the same for information services used to support IFCS negotiations under any model.⁸⁷ However, each model presents slightly different information needs that may affect the ultimate choice of institutions used to supply the information. Two key aspects of the negotiation under the Brazilian model include the carbon price paid to forest nations and the amount of funding available to reward these nations. Additional aspects of the negotiation under this model are the methods used to determine initial baseline emissions levels and establish incremental carbon savings.⁸⁸ Forest nations will not be willing to invest in new policies and programs unless they have a credible commitment from donor nations that sufficient funding will be available to reward these activities.⁸⁹ Donor nations, in contrast, will be unwilling to commit those funds without sufficient assurance that the program will deliver the expected carbon sequestration benefits. Since the Brazil model is not linked to emissions trading, the only benefit of the program to donor nations is its environmental impact—that is, its

86. See, e.g., MANCUR OLSON, *THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS* 43–44 (1971).

87. See *Convention Bodies*, *supra* note 81 and accompanying text.

88. See *supra* notes 33, 34 and accompanying text.

89. Donor nations have an incentive to promise funding, but may have little incentive to actually deliver the promised funding once developing countries have performed. In such situations, developing countries need a credible commitment that can overcome the initial worry that funders will not fulfill their promises. See OLIVER WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM* 163 (1985).

effectiveness at reducing atmospheric carbon levels.⁹⁰ Donor nations will be looking for evidence that the program as a whole will be effective, i.e., that forest nations have the capacity to effectively address forest carbon, and that enough forest nations participate to maintain the environmental integrity of the program.⁹¹

Because of these particular needs under the Brazilian model, negotiations will require information about the expected environmental and economic benefits of addressing atmospheric carbon levels through forest carbon programs.⁹² Parties will also need information about opportunity costs, particularly for key nations such as Brazil and Indonesia whose participation is crucial.⁹³ Parties will need sufficient information about past, current, and projected future forest trends to establish a starting baseline for rewarding countries. If donor nations are not satisfied that the program is achieving the desired environmental benefits, they will be unlikely to continue to fund the program.

As with the Brazilian model, under the Coalition Proposal forest nations will need similar assurance that their investments in forest poli-

90. In comparison, the coalition approach allows developed countries to purchase emissions credits that could be used to meet compliance obligations under national, international, or regional carbon reduction agreements. See Coalition Proposal, *supra* note 22 and accompanying text.

91. One of the challenges of developing an effective IFCS program is the potential for leakage. If a small number of countries enroll in an IFCS program, then it is possible that the gains in carbon sequestration in those countries will be dissipated as the economic drivers that lead to deforestation such as logging and agriculture, simply shift to other, non-enrolled countries. See, e.g., Brent Sohngen & Brian Murray, *Economic Consequences of Consideration of Permanence, Leakage and Additionality for Soil Carbon Sequestration Projects*, 80 CLIMATIC CHANGE 127 (2007).

92. This will require quantitative analysis not only of the potential avoided emissions due to the efforts of countries participating in the program, but also the impact of the program on total emissions, including an estimate of any leakage that may occur due to the program. See Brian C. Murray, NICHOLAS INST. FOR ENV'T'L POLICY SOLUTIONS, LEAKAGE FROM AN AVOIDED DEFORESTATION COMPENSATION POLICY: CONCEPTS, EMPIRICAL EVIDENCE, AND CORRECTIVE POLICY OPTIONS, 4–7, (June 2008), available at <http://forestclimatecenter.org/files/2008-06%20Leakage%20from%20an%20Avoided%20Deforestation%20Comopensation%20Policy%20-%20Concepts,%20Empirical%20Evidence,%20and%20Corrective%20Policy%20Options.pdf>.

93. Brazil has the world's largest extent of primary forest, estimated by the FAO at over 519 million hectares in 2010. FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, GLOBAL FOREST RESOURCES ASSESSMENT 2010, GLOBAL TABLES, TABLE 3 (2010), available at <http://www.fao.org/forestry/fra/fra2010/en/>. This large forest extent makes Brazil's participation crucial, since the carbon sequestration gains from other countries could be lost if Brazil engages in activities that release large amounts of carbon to the atmosphere. However, Brazil may choose to condition its participation upon the potential benefits from the IFCS program compared to the potential benefits of expanding timber and agricultural production.

cies and programs will be rewarded. However, unlike Brazil's system, this assurance must come from information about the expected market price for carbon credits or allowances at various points in the future.⁹⁴ Similarly, countries that plan to meet carbon reduction obligations by purchasing forest carbon credits will want to know the extent of their future obligations, as well as information about future carbon credit prices.⁹⁵ These needs must be supported by accurate modeling of the overall carbon agreement, as well as a credible commitment on the part of the international community that such an agreement will remain in force with relatively stable rules into the foreseeable future.

The PINC model and the Coalition model will require similar information support needs during the negotiation phase.⁹⁶ The PINC model is broader than the Coalition Proposal, including a wider scope of forest activities and a wider range of potential participating countries. However, the industrialized countries included under PINC are likely to be more self-sufficient in terms of information, and less likely to need to rely on international institutions for information support.⁹⁷

Under all IFCS models, parties will need information about countries' existing forest conditions as a starting place for determining baselines or reference levels. This information must be accurate enough to reassure the international community that forest credits will be awarded on the basis of additional carbon savings, so that the environmental integrity of the system is not undermined.⁹⁸ In addition, since buyer nations may be called upon to negotiate deeper abatement commitments as forest carbon credits come online, these nations need information about the environmental benefits of participating in the program. Finally, under the coalition approach, parties will need relevant information about a country's social, economic, and environmental conditions to establish development adjustment factors for individual nations.⁹⁹

94. Forest nations' expectations of future rewards for forest carbon activities will be based on expectations about future prices of emissions credits that can be sold to buyer nations. See Brazil Proposal, *supra* note 21, at 21–24; see *supra* text accompanying note 38.

95. See *id.*

96. Negotiation needs are simpler because the two models both rely on the idea that developing countries' forest carbon sequestration activities will be paid for by selling emissions credits. See Coalition Proposal *supra* note 22, at 3; see *supra* text accompanying note 43.

97. Industrialized nations generally have more resources to devote to obtaining information and analysis.

98. See Michael Obersteiner et al., *On Fair, Effective and Efficient REDD Mechanism Design*, 4 CARBON BALANCE AND MGMT. 11, 18 (2009) (explaining that inaccurate reference levels can lead to non-additional REDD credits, which undermine environmental integrity), available at <http://www.cbjournal.com/content/4/1/11>.

99. See Coalition Proposal, *supra* note 22, at 14; see *supra* text accompanying note 41.

2. Options to Provide Information

Ideal institutional arrangements will depend, at least in part, upon the IFCS model chosen. Because the coalition and PINC approaches tie IFCS credits to the carbon market, they require more detailed, accurate forest data than the Brazilian model requires. However, the Brazilian model may require highly detailed information and economic analysis targeted at a small handful of important forest nations.¹⁰⁰ All models will require detailed modeling and analysis of the expected economic impacts of the IFCS program at different levels of participation, as well as modeling and analysis of the expected impacts of climate change at different levels of participation.¹⁰¹

Existing institutions currently supply much of this information. For example, the Food and Agriculture Organization of the UN (FAO) provides global forest data,¹⁰² the World Bank provides economic modeling,¹⁰³ and the International Panel on Climate Change (IPCC) provides environmental modeling of climate change impacts.¹⁰⁴ UNFCCC subsidiary bodies, think tanks, environmental groups, and private contractors sometimes provide additional analysis and advice.¹⁰⁵ Continuing to use these institutions provides an advantage in terms of cost and time. However, in some instances the accuracy and credibility of information from these institutions may be compromised—for example, data from the

100. For example, the developing countries with the greatest forest carbon stocks, such as Brazil, may want to be able to compare the economic uses of their forest land—whether to produce REDD credits, forest products, or agricultural products—before they commit to a REDD program. See, e.g., Rhett A. Butler, Lian Pin Koh, & Jaboury Ghazoul, *REDD in the Red: Palm Oil Could Undermine Carbon Payment Schemes*, 2 CONSERVATION LETTERS 67, 69–70 (2009) available at <http://onlinelibrary.wiley.com/doi/10.1111/j.1755-263X.2009.00047.x/full> (comparing the expected profit per hectare of tropical forest from participating in a REDD program with producing palm oil).

101. Countries will need this information to make informed decisions in the negotiation process, particularly given the complexity of the climate change context. Moreover, since countries' costs and benefits may depend upon other nations' participation or failure to participate, modeling of expected outcomes under different scenarios will be particularly important. See Convention Bodies, *supra* note 81.

102. The FAO conducts comprehensive global Forest Resource Assessments every five years. The most recent assessment, FRA 2010, includes limited data about forest carbon stocks. See, e.g., FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, GLOBAL FOREST RESOURCES ASSESSMENT 2010 (2010), available at <http://www.fao.org/forestry/fra/fra2010/en/>.

103. See, e.g., Piet Buys et al., *Country Stakes in Climate Change Negotiations: Two Dimensions of Vulnerability*, 9 CLIMATE POL'Y 288 (2009) (developing a model for the way that economic and non-economic factors influence countries' climate change negotiation positions).

104. See, e.g., IPCC, FOURTH ASSESSMENT REPORT (2007), available at http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#TzIaYjJfzI.

105. See *supra* notes 81, 82, 83, 84, 85 and accompanying text.

FAO is self-reported from countries that may lack resources to comprehensively assess forest extent.¹⁰⁶ In other instances, the neutrality or accessibility of the institution may be a problem. In addition, the current arrangement can be overwhelming for participants, who must sort through information and analysis from a wide range of sources and must decide which sources of information are most useful and important in the negotiation process.

The World Trade Organization's (WTO) experience with international trade negotiations may provide a useful lesson for IFCS negotiations on how to provide information that will be useful to developing country parties. The World Bank, the OECD and the United Nations Conference on Trade and Development (UNCTAD) have traditionally provided some analysis of the impact of different trade policies to inform parties about upcoming trade negotiations.¹⁰⁷ These analyses, however, may reflect the perspectives of their institutional authors rather than inform individual nations' negotiating positions.¹⁰⁸

Following the Uruguay Round of WTO negotiations in 1990, both the WTO and UNCTAD have created formal procedures to help countries develop a negotiating position by allowing countries to request and obtain analysis on technical matters of interest.¹⁰⁹ Similar provisions have been included by negotiators of regional trade agreements like the Free Trade Area of the Americas.¹¹⁰ Increasingly, donor countries and NGOs also provide advice and analysis to developing countries, although, as Sheila Page, Senior Research Associate at the Overseas Development Institute, points out,

Where countries do not have clear objectives of their own, they are at risk of being pressured to support the views developed by their advisers, whether well-intentioned or not. In contrast where they have programmes of their own, the availability of expert legal, economic, or specialised advice can help

106. See *Forest Resources Assessment 2005—The Process: Documents for Reporting to FRA 2005*, FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, <http://www.fao.org/forestry/32171/en/> (last updated Dec. 9, 2011).

107. SHEILA PAGE, OVERSEAS DEV. INST., *DEVELOPING COUNTRIES IN GATT/WTO NEGOTIATIONS* 21 (2002), available at <http://www.acp-eu-trade.org/library/files/Page%20-%20Developing%20Countries%20in%20GATT-WTO%20Negotiations.pdf>.

108. *Id.* (observing that prior to the Uruguay Round of negotiations, the World Bank, and the OECD "prepared recklessly high estimates of the potential gains from trade [and] made optimistic assumptions about the extent of liberalization," while UNCTAD presented "a more skeptical point of view than the World Bank.").

109. *Id.* at 44.

110. *Id.* at 45.

them to participate more equally in international negotiations.¹¹¹

III. INSTITUTIONS TO SUPPORT IMPLEMENTATION AND GOVERNANCE

Under any of the IFCS models discussed, an institution or set of institutions will be needed to ensure the smooth functioning of the entire system. Measurement, monitoring, and verification of individual countries' performance is a crucial aspect of oversight, made all the more challenging because no global institution to date has measured forest carbon at the level of detail needed to support an IFCS system.¹¹² Other oversight functions are more familiar to participants in international agreements, such as issuing allowances, tracking allowances, enforcement, dispute resolution, and overall program evaluation.¹¹³ While the international community has some experience with these aspects of oversight, there are unique features of IFCS programs that require a new examination of the way these oversight functions might operate.

Measurement, monitoring, and oversight are difficult aspects of any international treaty. Stringent oversight and enforcement requirements can discourage the entry of new participants and encourage defec-

111. *Id.* at 46–47.

112. *See infra* note 139 and accompanying text.

113. The Kyoto Protocol and the European Union's Emissions Trading System (ETS) include provisions for similar oversight functions. Oversight of the ETS is done by the European Commission for Climate Action, which oversees monitoring and verification of countries' greenhouse gas emissions and provides oversight of the emissions trading market. *See* European Commission for Climate Action, *Emissions Trading System (EU ETS)*, EUROPEAN COMMISSION, http://ec.europa.eu/clima/policies/ets/index_en.htm (last updated Nov. 15, 2010). The Secretariat of the United Nations Framework Convention on Climate Change provides a similar oversight function for emissions trading through the flexibility mechanisms of the Kyoto Protocol. *See* Kyoto Protocol, *supra* note 25, at art. 8 (establishing a review process, led by the secretariat, to provide "thorough and comprehensive technical assessment of all aspects of the implementation by a Party of this Protocol"). The Kyoto Protocol also provides for dispute resolution through the International Court of Justice or by other procedures as determined by the parties to the UNFCCC. *See* Kyoto Protocol, *supra* note 25, art. 19; United Nations Framework Convention on Climate Change Art. 14, May 9, 1992, 1771 U.N.T.S. 107. However, the complexity of the Protocol, particularly the participation of private and non-party actors, raises a number of potential areas of dispute that might be best suited by a more complex dispute resolution system. *See generally* Peggy Rodgers Kalas & Alexia Herwig, *Dispute Resolution Under the Kyoto Protocol*, 27 *ECOLOGY L.Q.* 53 (2000). Neither the ETS nor the Kyoto Protocol have explicit provisions for overall program evaluation.

tion, thus undermining treaty participation.¹¹⁴ At the same time, however, lack of stringent enforcement standards can lead to lackluster efforts at meeting national commitments. This causes problems not only because lackluster performance can undermine the environmental effectiveness of the program, but also because it encourages other nations to underperform on their obligations.¹¹⁵

These challenges suggest two different aspects of political viability that must be addressed in the design of an appropriate oversight system. First, a politically viable oversight system cannot be too burdensome. If monitoring requirements are too costly, or if stringent sanctions for non-performance expose countries to significant risks, countries might avoid participation entirely, or leave the treaty before sanctions can be imposed. Second, however, a politically viable oversight system must be reliable enough to assure all participants that parties are meeting their obligations.¹¹⁶ Many international environmental treaties balance these two aspects of political viability by focusing oversight and enforcement on transparent monitoring systems and noncompliance procedures that provide a high degree of accountability but do not expose member states to coercive measures such as sanctions.¹¹⁷ The challenge with designing such an oversight system will be to balance both aspects of political viability with the need to minimize transaction costs.

In addition to the monitoring of specific nations, some sort of institutional support is needed to monitor and evaluate the performance of the entire system. This monitoring can be used to provide an oversight institution with information about overall system functioning. For example, an oversight institution will need to assess the supply and demand for IFCS credits (in the cases of the Coalition and PINC models), or to monitor forest nations' collective progress in reducing emissions (in the case of the Brazil model). The oversight institution will also need to determine whether nations are generally upholding their IFCS commit-

114. See, e.g., Scott Barrett & Robert Stavins, *Increasing Participation and Compliance in International Climate Change Agreements*, 3 INT'L ENVTL. AGREEMENTS: POL., L. AND ECON. 349, 359 (2002) (explaining the tradeoff between broad participation in environmental treaties and the stringency of treaty provisions). See also Mary Ellen O'Connell, *Enforcement and the Success of International Environmental Law*, 3 IND. J. GLOBAL LEGAL STUD. 47, 54 (1995) (identifying the "framework" convention as one response to this tradeoff, in which a broad set of countries may agree to a common set of principles, and enforceable provisions are added to the agreement over time as parties agree to be bound to take particular actions).

115. OLSON, *supra* note 86, at 27.

116. See Barrett & Stavins, *supra* note 114, at 359. Reliable oversight helps to provide a credible commitment that other countries are complying with the agreement, which is necessary for other participants to provide support. See WILLIAMSON, *supra* note 89, at 163.

117. See, e.g., Edith Brown Weiss, *Understanding Compliance with International Environmental Agreements: The Baker's Dozen Myths*, 32 U. RICH. L. REV. 1555, 1584-85 (1999).

ments, to assess whether the program is in fact providing the anticipated environmental benefits, and to address unforeseen problems as they occur.

The Multilateral Fund (Fund) of the Montreal Protocol (Protocol) illustrates the way such a monitoring system might work. The Protocol's Fund was the first financial mechanism to come from an international treaty.¹¹⁸ Developed countries contribute to the Fund, which assists developing countries to phase out the use of ozone-depleting substances. The monitoring and evaluation processes of the Fund seek to oversee not only actual use of the Fund, but also overall effectiveness at meeting the goals of the Protocol. The evaluation process includes gathering "information on the strengths and limitations of various types of projects and phase-out plans, the major causes of failures to reach targets, lessons learnt during implementation and recommendations for actions to improve performance of the Fund."¹¹⁹

The Protocol Secretariat's Executive Committee oversees monitoring and evaluation work. In addition to monitoring individual projects, the Committee approves proposed studies to evaluate different aspects of the Fund. Independent evaluators conduct the proposed studies.¹²⁰ These evaluations have been used to identify aspects of the Protocol that are on track to succeed, countries that are underperforming, and incentives for countries to comply.¹²¹

118. *About the Multilateral Fund: Overview*, MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL, <http://www.multilateralfund.org/aboutMLF/default.aspx> (last visited Feb. 11, 2012).

119. *Monitoring and Evaluation*, MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL, <http://www.multilateralfund.org/Evaluation/default.aspx> (last visited Feb. 11, 2012).

120. *Id.*

121. *Monitoring, Evaluation and Institutional Learning: Lessons from the Multilateral Fund*, MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL 4, available at http://www.unmfs.org/live_version/FS1-web3.pdf (last visited Mar. 3, 2012).

A. Measurement, Monitoring, and Verification

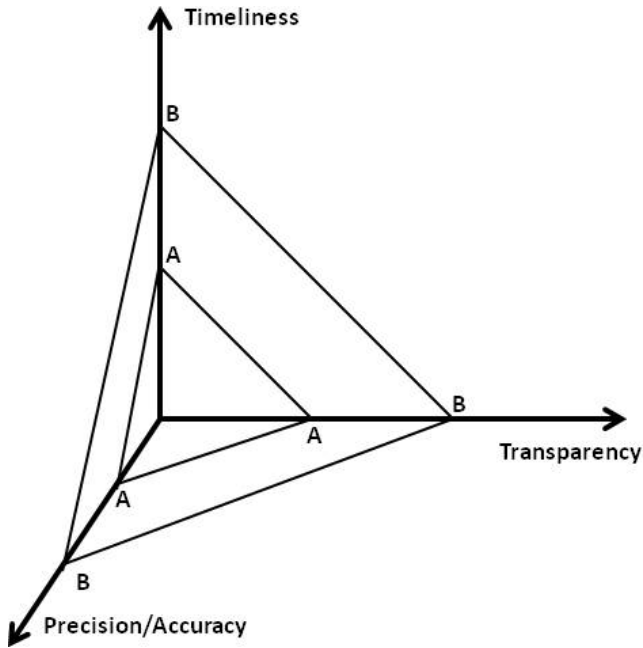


Figure 2: Isocost Planes for Performance Characteristics of an IFCS Program Monitoring System¹²²

All of the IFCS options require accurate assessments of changes in forest carbon flows or stocks that can be used to estimate carbon emissions avoided and/or increases in carbon inventories. In addition to accuracy, these assessments must be transparent so that all parties are confident in the amount of carbon savings they represent. This is equally true for developing nations and for the international community. To develop confidence and trust in the program, developing nations need to know that they are fully rewarded for their efforts. At the same time the international community needs to know that the carbon credits generated through forestry programs represent real net emissions reductions. In addition to accuracy and transparency, measurements should be timely enough to be usable in a periodic system of measurement and reward, particularly for the PINC system. Finally, the cost of the measurement function needs to be minimized.

122. Krister Andersson, et al., *supra* note 28, at 89.

Figure 2 models the tradeoffs between timeliness, transparency, and precision. In the abstract, if one thinks of these three characteristics as being measured along three different dimensions, then it is possible to describe any national inventory program as falling somewhere in “inventory space” (this of course assumes other important factors are held constant, such as the number of participating parties in the program).¹²³ In Figure 2, the coordinates of this space are expressed as measures of timeliness, precision/accuracy, and transparency. Moreover, each point in this “inventory space” will have a cost associated with it, which might be measured in dollars per year. Collecting all of the points in the space that have a given cost, say A dollars per year, will provide a set of possible design combinations that economists call an “isocost” plane. The isocost plane A in Figure 2 is a collection of all combinations of programs (each described in terms of timeliness, precision/accuracy, and transparency) that have a cost of A dollars per year.¹²⁴ This illustrates that if a significant amount of precision is needed, for example, then timeliness and transparency may need to be sacrificed. If precision, timeliness, and transparency are all needed, then the costs will increase.

This means that for any given cost, there are a host of inventory designs, each with a different combination of timeliness, precision/accuracy, and transparency. Designing a program for a given cost will involve making tradeoffs among the three characteristics. For example, achieving increased precision and accuracy of inventory estimates might require managers to assign more resources to increase the sample size of field plots. Ensuring more transparency in the preparation and reporting of results also carries costs—more public scrutiny will require modifying working routines for data collection, analysis, processing, and communication of data, methods, and results, as well as broader participation of nongovernmental actors in all stages of the inventory. Finally, improving the timeliness of the reported results of the inventory will also require more resources to speed up the work during the data collection and processing stages.

Advances in technologies such as remote sensing provide promising tools for measurement and verification of forest carbon stocks. While these technologies are promising, they do not offer a stand-alone tool for measuring forest carbon stocks.¹²⁵ REDD analyses often recommend a

123. Krister Andersson, *supra* note 28, at 88.

124. The isocost plane is depicted as flat, though the result could easily be a curved paraboloid.

125. See, e.g., Holly K. Gibbs et al., *Monitoring and Estimating Tropical Forest Carbon Stocks: Making REDD a Reality*, 2 ENVTL. RES. LETT. 045023 (2007), available at http://iop.science.iop.org/1748-9326/2/4/045023/pdf/1748-9326_2_4_045023.pdf.

combination of remote sensing and field measurements to measure and verify changes in carbon stocks.¹²⁶ However, different types of remote-sensing technologies provide different levels of accuracy and incur different levels of cost.¹²⁷ Similarly, the accuracy of field measurements depends upon the amount of time that can be devoted to data collection and the number of field measurements that can be taken. Moreover, achieving a high level of transparency in the measurement process will also raise measurement costs. Thus, any choice of measurement technologies involves tradeoffs between accuracy, transparency, timeliness, and cost.¹²⁸

These tradeoffs are important considerations when determining how to organize measurement and verification support. Choices between these tradeoffs will also depend upon the choice of IFCS model. Under the Brazil approach, for example, cost minimization may be a higher priority than under the PINC or Coalition models, since the funding stream under the Brazil model is more limited than the funding stream in the other models. Transparency of the measurement system is more important under either the PINC model or the Coalition model, since overall confidence in the program can have tremendous impact on the success or failure of the larger carbon trading system. Accuracy is most important under the PINC model, which requires measurement of forest carbon due to all changes—not only deforestation, but also degradation, afforestation, reforestation, and other land use changes.¹²⁹ Also, because the stakes are so much higher with the PINC program—which is much broader in scope than the other two models—both accuracy and transparency are going to be more critical.

The FAO currently provides significant amounts of information about forest type, extent, and carbon content.¹³⁰ While this information is admittedly flawed,¹³¹ due to limitations and inconsistencies in the way countries self-report their forest data, it provides an initial assessment of the state of the world's forest carbon stocks and presents a model for collection, measurement, and verification of forest carbon data. The FAO

126. See PETER HOLMGREN, UN-REDD PROGRAMME, *ROLE OF SATELLITE REMOTE SENSING IN REDD 6* (2008).

127. Gibbs, *supra* note 125, at 79–80.

128. Gibbs, *supra* note 125, at 88–89.

129. See MARKU KANNINEN ET AL., *CTR. FOR INT'L FORESTRY RESEARCH, DO TREES GROW ON MONEY? THE IMPLICATIONS OF DEFORESTATION RESEARCH FOR POLICIES TO PROMOTE REDD 10* (2007) (commenting that measurement of degradation requires higher resolution data compared to measurement of deforestation).

130. See *supra* note 102 and accompanying text.

131. See, e.g., Alan Grainger, *Difficulties in Tracking the Long-Term Global Trend in Tropical Forest Area*, 105 *Proc. Nat'l Acad. Sci.* 818, 820–23 (2008).

approach relies heavily on self-reporting by individual countries, using a common reporting format. The FAO then compiles, analyzes, and publishes the data.¹³²

The current approach used by FAO suggests a possible strategy for measurement and verification, in which nations are primarily responsible for measurement, with an international institution that harmonizes the data collection process, provides technical assistance, publishes the measurements, and verifies the accuracy of the measurements themselves. The advantage of this approach is that transaction costs are minimized, since countries have the logistical advantage of proximity to the forests. Further, the support of a single institution takes advantage of economies of scale in harmonizing data collection methods and providing technical assistance. This approach also offers some economies of scale to individual nations, who can combine data collection efforts with implementation of forest policies and programs and improved capacity building via increased involvement of stakeholders.

There are several disadvantages of this approach, however. One major concern is that some nations lack the capacity to conduct these assessments.¹³³ In addition, this approach requires extensive effort by the FAO (or similar organizations) to ensure that countries use common reporting definitions and methodologies so that data may be accurately aggregated.¹³⁴ In addition, nations may have an incentive to misrepresent the data to gain the maximum benefit in the negotiation and/or compensation phases of the IFCS program. If the risk of misrepresentation is high, the IFCS program will require significantly more verification than the FAO currently provides to ensure that forest stocks are measured accurately and to provide all participants with confidence about the effectiveness of the IFCS program.¹³⁵

132. See *supra* note 108 and accompanying text; see also FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, GLOBAL FOREST RESOURCES ASSESSMENT 2005 6 (2005), available at <http://www.fao.org/forestry/fra/fra2005/en/>.

133. See MARTIN HEROLD, GOF-C-GOLD LAND COVER PROJECT OFFICE AND FRIEDRICH SCHILLER UNIVERSITY JENA, AN ASSESSMENT OF NATIONAL FOREST MONITORING CAPABILITIES IN TROPICAL NON-ANNEX I COUNTRIES: RECOMMENDATIONS FOR CAPACITY BUILDING 1 (2009), available at https://unfccc.int/files/methods_science/redd/country_specific_information/application/pdf/redd_nat_capacity_report_herold_july09_publ.pdf (“only 3 out of the 99 countries currently have capacities considered to be very good for both forest area change monitoring and for forest inventories”).

134. Lack of common definitions and methodologies has diminished the accuracy of the FAO reports, which rely on a common reporting format for all countries, even though countries’ actual field measurements may use different categories and definitions as the basis for measurement.

135. See WILLIAMSON, *supra* note 89, at 163. Increased monitoring and verification is one way to provide a more credible commitment.

These disadvantages could be minimized by allowing some countries to conduct joint measurements where doing so would represent an economy of scale as, for example, in the case of West African countries that share geographic proximity and similar forest conditions.¹³⁶ The disadvantages of self-monitoring can also be addressed through appropriate assistance, monitoring, and verification. Doing so, however, will increase overall IFCS program costs.¹³⁷

An alternative option would be to create an international entity to undertake all measurement activities, or delegate this task to the FAO, which has considerable expertise in global forest assessments. However, such an approach would require the same capacity building problems faced by individual nations, since not even the FAO currently has the capacity to undertake such a large forest carbon measurement process at the level of detail necessary to support an IFCS program.¹³⁸ Building existing capacity within the FAO or creating a new entity would both require tremendous resources.¹³⁹ However, such an entity would have no incentive to misrepresent data, would require less oversight and verification, and could use uniform, transparent data collection methodologies.

136. For example, the West African nations of Togo, Benin, Mali, Burkina Faso, and Cote d'Ivoire are all contiguous, with little or no primary forest, few planted forests, and predominance of naturally regenerated forests. See FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, GLOBAL FOREST RESOURCES ASSESSMENT 2010, GLOBAL TABLES, TABLE 7 (2010), available at <http://www.fao.org/forestry/fra/fra2010/en/>.

137. Leading up to FAO's Forest Resource Assessment 2005, experts estimated that the cost of verifying a country's national forest estimates by using field studies would cost over US \$1 million; using remote sensing, verification would cost over US \$18 million. See generally ERKKI TOMPPU & RAY CZAPLEWSKI, THE ROLE OF REMOTE SENSING IN GLOBAL FOREST ASSESSMENTS (2002), available at <http://www.fao.org/forestry/4622-0144a64b00140daaa5ec91535ae8848a0.pdf>.

138. The Food and Agriculture Organization of the UN (FAO) conducts global forest assessments every five years, including an estimate of forest carbon stocks. See, e.g., FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, GLOBAL FOREST RESOURCES ASSESSMENT 2010 (2010), available at <http://www.fao.org/docrep/013/i1757e/i1757e.pdf>. Data in these forest resource assessments are provided by individual countries with considerable guidance from FAO staff; data are also supplemented with a global remote sensing survey. See *id.* at 5–9, 24. While the Global Forest Resource Assessment 2010 (FRA) is the most comprehensive attempt to estimate changes in forest carbon stocks, it is not a full and complete assessment. For example, the FRA includes only estimates of carbon in above-ground forest biomass, thus excluding carbon in soil and leaf litter. See *id.* at 272.

139. FAO has improved its capacity to measure forests and changes in forest carbon stocks over time; nonetheless, accurately monitoring forest carbon takes significant resources, including GPS technology and a trained workforce to carry out the assessments. See generally Margaret M. Skutsch et al., *Case Studies on Measuring and Assessing Forest Degradation: Community Measurement of Carbon Stock Change for REDD* (Forest Resources Assessment Working Paper 156, 2009), available at <http://www.fao.org/docrep/012/k6869e/k6869e00.pdf>.

A related option is to use third-party contractors to conduct measurements.¹⁴⁰ Under this approach, private contractors, universities, or other entities could bid for contracts to conduct the national assessments. This approach might also be used *only* in countries that currently lack the capacity to measure forest carbon, perhaps in conjunction with requirements that private contractors transfer technology to host nations as part of the measurement process. This approach would address the problem of capacity without the need to raise significant funds. It would also address the incentive to misrepresent data—although it might introduce a new problem if contractors are tempted to minimize costs in ways that affect accuracy.¹⁴¹ However, it would require an entity to coordinate and monitor each contract, from the bidding process to the results. In addition, this approach could create problems with transparency if the contracts do not provide adequate guidelines about the methods that should be used and the ways that information should be reported.

B. Creating and Tracking Sequestration-Based Allowances

In many ways the Brazil Proposal is the simplest of the three models discussed above. Developing countries will undertake forest sequestration activities, their accomplishments will be assessed, and payments will be made in proportion to the gains.¹⁴² Both the Coalition and PINC approaches, however, are linked to an emissions allowance trading program. In these programs, the analog to making a payment is creating and transferring marketable allowances that can be used interchangeably with emissions allowances.¹⁴³ Whether the IFCS is structured around payments or allowances, it will require an international body that certifies forest nations' accomplishments and transfers the rewards to the appropriate national government entity. The information requirements are similar under each, although the administrative process may be different.

The two models under which the IFCS is linked to an emissions trading system, however, will also require a system for tracking the al-

140. Some countries already rely on private contractors to prepare country reports for FAO's Forest Resource Assessments. See, e.g., LTS INT'L, CAPABILITY AND COST ASSESSMENT OF THE MAJOR FOREST NATIONS TO MEASURE AND MONITOR THEIR FOREST CARBON 102 (2008), available at <http://www.ibcperu.org/doc/isis/11466.pdf>.

141. Another potential conflict could arise if the contractors were engaged directly by the countries that they are assessing. In that case, contractors might have an incentive to render particularly generous assessments with the hope of securing the next contract. This is a problem endemic to any type of certification function—it is not specific to the IFCS application.

142. See Brazil Proposal, *supra* note 21 and accompanying text.

143. See Coalition Proposal, *supra* note 22; see PINC Proposal, *supra* note 23.

allowances as they are transferred from country-to-country and, most likely, from one private party to another.¹⁴⁴ But this does not require an entirely independent institution for IFCS. Rather, the emissions trading program would almost certainly perform this function. It would, however, be necessary for the IFCS program and the entity administering and monitoring the emissions trading system to work together. At a minimum, the IFCS system would have to pass along records regarding the creation of sequestration-backed allowances.¹⁴⁵ Under the PINC approach, the IFCS and the emissions trading administrators would also have to coordinate the assessments of any liabilities that countries incur for losses of carbon stocks from one evaluation period to the next.

C. Enforcement and Dispute Resolution

An IFCS program also requires support from appropriate institutions for enforcement and dispute resolution.¹⁴⁶ As with a monitoring program, the complexity of this support service will depend upon the IFCS model chosen and the likely conflicts that could arise. A dispute resolution committee, perhaps as a part of the transaction support insti-

144. As an example, Certified Emissions Reductions generated under the Kyoto Protocol's Clean Development Mechanism are tracked in a registry that provides accounting for CERs issued, held, transferred, or acquired under the CDM. Participating parties and other participants (such as project developers) must maintain accounts in the registry's database and record all transactions in a transparent manner. See Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Nov. 28–Dec. 10, 2005, U.N. Doc. FCCC/KP/CMP/2005/8/Add.1, 27–29 (Mar. 30, 2006), available at <http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf> [hereinafter Montreal Conference].

145. This is the process for CERs generated under the CDM, which requires the CDM registry to meet the same technical standards so that data on CER transfers can be easily exchanged with other emissions and credit tracking accounts under the Kyoto Protocol. See *id.* at 27.

146. The Kyoto Protocol does not have an elaborately defined enforcement system, although there are a wide range of enforcement-related disputes that could arise. See generally Kalas and Herwig, *supra* note 113. Several countries have failed to meet one or more of their Kyoto obligations, usually in providing accurate and timely national greenhouse gas inventories. See, e.g., Hellenic Republic Ministry for the Environment Physical Planning and Public Works, *Submission of Greece to the Compliance Committee*, U.N. Doc. CC-2007-1-10/GREECE/EB/7-10-08 (July 16, 2008), available at http://unfccc.int/files/kyoto_protocol/compliance/enforcement_branch/application/pdf/cc-2007-1-11_greece_eb_revised_plan.pdf (describing the reasons for Greece's noncompliance and proposing a plan for working with the UNFCCC to come back into compliance). The approach under the Kyoto Protocol thus far has been to facilitate the country's compliance efforts. See generally *id.* However, if an IFCS program were to be implemented on a global scale, it would likely become necessary to implement a compliance system that would provide all participants with credible assurance that other parties will be held to their commitments. See WILLIAMSON, *supra* note 89, at 163.

tutions, might be sufficient to support the simpler Brazil approach. The Coalition and PINC approaches are more complex and could face conflicts about a wide range of issues within the program.¹⁴⁷ These might require a more substantial dispute resolution process.

Key characteristics for any dispute resolution body will be neutrality, technical expertise, and legal expertise. Dispute resolution bodies also need enough authority to enforce their decisions and adequate resources to resolve disputes in a timely fashion.¹⁴⁸ These key needs suggest that any dispute resolution system should be adequately staffed by representatives from a wide range of countries—both forest nations and donor or buyer nations.¹⁴⁹ This dispute resolution body also needs to have access to specialized knowledge: technical information about the way forest carbon measurements are conducted under the IFCS program, legal information about the IFCS treaty itself, and finance information about the way the carbon transactions should be conducted.

Regardless of the IFCS model, the dispute resolution process should begin through the development of transparent rules before disputes even occur. Clear, transparent, and fair rules are crucial for any dispute resolution body to resolve problems among the parties to the IFCS program. In addition to clear rules, the dispute resolution process itself should be well-defined and accessible to all parties. Parties should know whether they have a set time limit for raising and responding to conflicts, what kind of procedures they must adhere to, and what kinds of procedural due process they can expect.

The parties¹⁵⁰ affected by these rules should be able to amend them as needed in response to changed conditions or experience with the program.¹⁵¹ The rule amendment function could be provided within the IFCS treaty framework itself, or as a separate institution or committee

147. For example, a dispute about whether a forest nation had permanently sequestered carbon that was credited on the international carbon market could easily have effects beyond the IFCS system. The CDM provides a mechanism to account for “excess CERs” that result when an implementing entity withdraws from the program or loses certification, but it is not clear what would happen if a country disputed this process. See Montreal Conference, *supra* note 144, at 27.

148. In the WTO, for example, where disputes are disruptive to the flow of trade, disputes are generally settled within a year. *Understanding the WTO: Settling Disputes*, WORLD TRADE ORG., http://www.wto.org/english/thewto_e/whatis_e/tif_e/disp1_e.htm (last visited Feb. 12, 2012).

149. This promotes neutrality of the dispute settlement body. In the WTO, all WTO member countries are represented on the dispute settlement body. See *id.*

150. Parties to the IFCS program itself.

151. See OSTROM, *supra* note 29, at 90 (identifying several key characteristics of long-enduring common pool resource institutions, including the ability of affected individuals to participate in modifying operational rules).

devoted to the implementation of IFCS rules. Since developing new institutions is time-consuming and adds expense, a new institution should be created only if existing institutions are not sufficiently transparent and representative to meet the rule needs of the IFCS program.

The WTO offers one model for the way dispute resolution might work under an IFCS program. The WTO members have agreed to a dispute settlement understanding (DSU)¹⁵² that suits the members' needs for quick and neutral resolution of disputes. Under the DSU, individual nations bring complaints of other nations' violations of the WTO treaty.¹⁵³ Complaining nations must first raise problems with the alleged violator. If suitable arrangements cannot be made between the parties, complaints are brought to the WTO's dispute resolution panel, staffed by representatives from a wide range of developed and developing nations.¹⁵⁴ Panel decisions may be appealed to the WTO's appellate body. Panel and appellate body decisions are officially adopted by the WTO unless the WTO members unanimously reject the decision. The WTO panel includes use of a wide range of legal remedies tailored to international trade.¹⁵⁵ The DSU allows for injunction, use of trade retaliation, or compensation of prospective damages by offending countries, often in the form of additional trade concessions.¹⁵⁶

International environmental treaties also offer an alternative model for enforcement and dispute resolution.¹⁵⁷ Treaty enforcement and dispute resolution processes must be designed to carefully balance the need for effective enforcement with the risk of discouraging participation in the system. This problem was handled effectively by the Montreal Protocol, which established trade sanctions against non-participants as a means of both inducing participation in the Protocol and handling the risks of noncompliance.¹⁵⁸ In practice, however, the Protocol has relied

152. See Marrakesh Agreement Establishing the World Trade Organization, Annex 2: Understanding on Rules and Procedures Governing the Settlement of Disputes, Apr. 15, 1994, 1867 U.N.T.S. 154 [hereinafter Annex 2], available at http://www.wto.org/english/docs_e/legal_e/28-dsu.pdf.

153. *Id.* at 356.

154. *Id.* at 358–59.

155. See *id.* at 367–69.

156. *Id.*

157. Many environmental treaties take a nonbinding “soft law” approach to environmental agreements, because it is easier for more countries to agree to nonbinding treaties. Barrett & Stavins, *supra* note 113, at 359; See also Alan Boyle, *Some Reflections on the Relationship of Treaties and Soft Law*, 48 INT’L & COMP. L.Q. 901, 903 (1999). Nonetheless, even “soft law” treaties contain noncompliance procedures that are used to enforce provisions that may provide useful lessons for an IFCS agreement. *Id.* at 909–10.

158. It is not clear, however, whether trade sanctions for noncompliance under the UNFCCC or the Kyoto Protocol would be as effective. The trade sanctions under the Mon-

less on trade sanctions and more on a compliance committee that investigates alleged instances of noncompliance and works with violators to improve performance.¹⁵⁹

The Montreal Protocol dispute resolution system might be unsuitable in an IFCS context, however. One primary reason is that IFCS presents a much more difficult collective action problem.¹⁶⁰ Under the Montreal Protocol, the benefits of addressing the ozone problem so outweigh the costs to industry that key participants, such as the United States, have a strong incentive to comply.¹⁶¹ In contrast, participants to an IFCS agreement may have strong incentives not to comply, or to strategically withdraw after benefits have been received.¹⁶² Because of these incentives, an IFCS program needs a dispute resolution that will ensure that all participants comply as promised.

In contrast, the WTO has a dispute resolution model that allows the parties to challenge other parties' violations of their agreements, provides the basis for enforcement actions, and has been regularly used throughout the 15 years the WTO has been in existence.¹⁶³ One particularly appealing aspect of the WTO approach is that it offers several distinct layers of dispute resolution—informal between the parties,

Montreal Protocol are widely viewed as violations of the WTO, but have not been challenged because most of the substances regulated under the Montreal Protocol are manufactured in a small number of nations. Trade sanctions imposed as part of the UNFCCC or the Kyoto Protocol would almost certainly be challenged, and it is not clear that sanctions could be designed that comport with current WTO rules.

159. Boyle, *supra* note 157, at 910–11.

160. Collective action problems occur when individually rational courses of action will result in worse conditions for the group as a whole. See generally MANCUR OLSEN, *THE LOGIC OF COLLECTIVE ACTION* (1995). A commonly cited collective action problem in environmental policy is Garrett Hardin's tragedy of the commons, in which individuals' best course of action will be to over-use a common pool resource, to the detriment of the entire group. See generally Garret Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243 (1968).

161. Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 *HARV. ENVTL. L. REV.* 2, 5 (2007).

162. For example, forest nations might have an incentive to agree to participate, but to reduce implementation of forest management programs if the price of payments from carbon sequestration decreases, or if prices of forest products increase. Forest nations might also have an incentive to misrepresent forest carbon sequestration data to receive inflated payments. Developed countries might also have an incentive to shirk compliance over time, for example by failing to deliver funds as promised. See, e.g., *supra* note 89 and accompanying text.

163. See Annex 2, *supra* note 152. See also Chad P. Bown & Rachel McCulloch, *Developing Countries, Dispute Settlement, and the Advisory Centre on WTO Law*, 19 *J. INT'L TRADE & ECON. DEV.* 33 (2010) (describing use of the WTO dispute settlement process to enforce WTO provisions).

intermediary panel decisions, and appeals before an appellate board.¹⁶⁴ In an IFCS program, a variation on this model might include layers of dispute resolution in which IFCS panels, appeals boards, and the like have particular expertise. For example, countries might be able to appeal verification decisions to an appeals board within the forest carbon verification institution, or appeal accounting treatment to an appeals board within the transaction and finance institutions. This would allow disputes about highly technical aspects of IFCS to be reviewed by parties that have particular expertise in these areas.

Another feature of the WTO system that could prove useful in the IFCS context is the availability of specific remedies.¹⁶⁵ A dispute resolution body should be able to enjoin IFCS participants from using methods that violate the IFCS program. This could apply to methods of measuring forest carbon, but it could also extend to other aspects of the program. For example, injunctions could be used to enforce aspects of an IFCS program that are designed to protect the rights of indigenous people or other populations that rely on the use of forests. Other specific remedies could be helpful in other contexts—for example, REDD parties could re-adjust baselines as a remedy for misrepresenting data about national forest trends.

One key aspect from the WTO model is that the WTO relies on individual nations to enforce the system.¹⁶⁶ Under the IFCS program, there are several different options for determining who has standing to raise complaints. In addition to individual countries, it might be useful to give standing to other key stakeholders, such as environmental groups, community organizations, landowners, and forest trade groups. Since these actors are actively involved in the IFCS implementation process, they are in the best position to monitor implementation and detect non-compliance; thus, giving these entities standing would be somewhat analogous to citizens' suit provisions in U.S. environmental law, which give community groups a role in enforcement.¹⁶⁷ However, involving

164. Robert Hudec, *The New WTO Dispute Settlement Procedure: An Overview of the First Three Years*, 8 MINN. J. GLOBAL TRADE 1, 25–28 (1999).

165. The WTO DSU allows countries to impose countermeasures on those who failed to comply with aspects of the WTO agreement, although these countermeasures are not designed to be punitive and limit the extent of remedies so that remedies are proportional to the damages suffered. See Annex 2, *supra* note 152. See also Henrik Horn & Petros C. Mavroidis, *Remedies in the WTO Dispute Settlement System and Developing Country Interests*, WORLD BANK INSTITUTE 6-7 (Mar. 20, 1999), available at <http://www.econ-law.se/Papers/Remedies%20990611-1.pdf>.

166. The dispute resolution process begins when one member country brings a complaint against another member country. Annex 2, *supra* note 152, at 358–59.

167. Wendy Naysnerski & Tom Teitenberg, *Private Enforcement of Federal Environmental Law*, 68 LAND ECONOMICS 28, 28–29 (1992).

these actors also increases transaction costs significantly, since the IFCS dispute resolution system would need to provide access to these entities, many of whom will be geographically dispersed.

D. Evaluating Program Performance

Program evaluation is a critical element of many public undertakings, particularly in cases where the policies, projects, or approaches are new and innovative. Not only does ongoing evaluation of the program allow adjustments in operations, but it can help to maintain political support by demonstrating effectiveness.¹⁶⁸ If participating nations perceive that an IFCS program is ineffective and incapable of identifying and resolving problems, they may leave the program or minimize their participation.

There will be a need for program evaluation at the national level. When a country agrees to participate in an IFCS program, new policies and activities will refocus efforts to protect and increase carbon stocks in forests.¹⁶⁹ There may be any number of unanticipated outcomes and perturbing factors.

In addition to monitoring individual countries' performances, program evaluation should consider the performance of the program as a whole. Where individual nations are evaluated for changes in the carbon stocks within their borders, a program evaluation would entail assessment of changes in global forest stocks. Program evaluation should also include assessment of the cost savings associated with carbon sequestration vis-à-vis a pure energy emissions approach as well as an estimation of the costs of administering the IFCS program.

168. An excellent example of the need to demonstrate effectiveness can be seen in the European Emissions Trading System. Near the end of the first compliance period of the ETS in 2007, the allowance price dropped substantially and the ETS was heavily criticized for setting the EU-wide cap too high. DENNY ELLERMAN & PAUL JOSKOW, *THE EUROPEAN UNION'S EMISSIONS TRADING SYSTEM IN PERSPECTIVE* 13 (2008). Since then, the ETS has worked to identify and rectify problems and demonstrate both improvement and effectiveness. LARRY PARKER, *CLIMATE CHANGE AND THE EU EMISSIONS TRADING SCHEME (ETS): LOOKING INTO 2020* 2–3 (2010). Several members of the EU have legally challenged aspects of the way that the ETS is run; gaining the support of these nations will be important as the ETS continues its efforts at reform. ELLERMAN & JOSKOW, *supra* at 10–11.

169. Reversing deforestation trends can require a wide range of policy changes that address issues such as who owns land, which entities should be involved in REDD, and how to ensure that carbon savings are permanent. *See generally* Costenbader, *supra* note 20.

IV. INSTITUTIONS TO INDUCE AND MAINTAIN PARTICIPATION

An international forest carbon sequestration program will only succeed if it induces countries with land and forest resources to participate.¹⁷⁰ Countries decide to participate in international agreements based partly upon the expected costs and benefits of participation, and partly on their expectations about other countries' behavior. To achieve high participation rates, an IFCS program must reduce the upfront costs and provide parties with assurance that long-term benefits will materialize as expected. The program must also address the possibility that some participants may withdraw or under-comply. Both of these tasks will require an understanding of both the key characteristics of forest carbon sequestration activities and the nature of the participant countries.

There are two particularly important characteristics of carbon sequestration activities that inform institutional design. The first is that in many cases—e.g., afforestation, reforestation, and modified forest management—there are very long lag times between initial investments and the development of a recognizable difference that earns rewards in the international arena.¹⁷¹ In the case of new forest plantations in North America, depending upon the location and species, it can take anywhere from 8 to 80 years for newly planted forests to hit their peak uptake rate.¹⁷² This significant lag time not only postpones the financial returns on investments, it increases risks to all parties to the transaction. The second important characteristic of terrestrial sequestration is that it is reversible. Forest fires, disease, pest infestations, and even illegal (or sanctioned) harvesting can all quickly reverse the gains in a country's forest carbon sequestration.¹⁷³ Some of the sources of reversal are clearly within the control of the government while others are not, but the probability of each can at least be influenced by the governments' precautionary measures and enforcement.

170. See FOOD AND AGRIC. ORG. OF THE UNITED NATIONS, *supra* note 92 and accompanying text.

171. Even under the CDM, where credits can be sold before the full carbon benefits of forestry projects accrue, measurement of afforestation CDM projects occurs only once every five years. Unna Chokkalingam & S. Anuradha Vanniarachchy, *CDM AR Did Not Fail and Is Not Dead*, FOREST CARBON ASIA (July 2011), <http://www.forestcarbonasia.org/articles/cdm-ar-did-not-fail-and-is-not-dead/>.

172. K. Richards, R. Moulton & R. Birdsey, *Costs of Creation of Carbon Sinks in the U.S.*, 34 ENERGY CONVERSION AND MGMT. 905, 905–12 (1993).

173. C.S. Kim et al., *Permanence of Carbon Sequestered in Forests Under Uncertainty*, 2–5 (paper presented at Agricultural & Applied Economic Association Meeting, July 24–26, 2001), available at http://ageconsearch.umn.edu/bitstream/103565/1/AAEA_Kim_et_al_ID13477.pdf.

The capacity of countries to respond to incentives provided under an IFCS program will depend, at least in part, on their economic status. Of the 32 countries listed in Figure 1 (see Part II.A) as having significant potential to participate in an IFCS program (groups B, C, and D), only five¹⁷⁴ are recognized as advanced economies by the International Monetary Fund (IMF).¹⁷⁵ Of the 27 that are listed as emerging and developing economies by the IMF, six¹⁷⁶ are described by the UN as among the least developed countries.¹⁷⁷

These physical and economic realities lead to several institutional design considerations. First, it will be necessary to provide mechanisms for many of the participant countries to access upfront, long-term financing for their investments in forest carbon sequestration.¹⁷⁸ Second, because in many cases the bulk of carbon gains from new forest projects and policies do not accrue until decades into the future, the international community will have to find mechanisms to credibly commit to maintaining the economic incentives for continued forest carbon sequestration. Third, to the extent that an IFCS program rewards forest countries in anticipation of carbon sequestration gains, it will be necessary to develop mechanisms to discourage strategic withdrawal by those participants.¹⁷⁹ Finally, given the potential for reversibility of terrestrial carbon sequestration gains, an IFCS program will need to develop institutions to allocate the risk in a way that maintains incentives for risk mitigation but does not unduly burden those countries least able to bear the risk.¹⁸⁰

A. Upfront Financing

One of the key needs for many developing nations will be the availability of upfront financing to launch programs, policies, and measurement efforts. Adequate upfront financing for these activities is not

174. Australia, Canada, Spain, China, and the U.S.

175. World Economic and Financial Surveys, INT'L MONETARY FUND, <http://www.imf.org/external/pubs/ft/weo/2009/01/weodata/groups.htm> (last visited Feb. 4, 2011).

176. Angola, Cambodia, Ethiopia, Myanmar, Sudan, and Zambia.

177. See U.N. OFFICE OF THE HIGH REP. FOR THE LEAST DEVELOPED COUNTRIES, LAND-LOCKED DEVELOPING COUNTRIES AND THE SMALL ISLAND DEVELOPING STATES (UN-OHRLLS), <http://www.unohrlls.org/en/ldc/related/62/> (last visited Feb. 4, 2011).

178. See, e.g., Michael Dutschke & Sheila Wertz-Kanounniko, *Financing REDD: Linking Country Needs and Financing Sources*, CIFOR INFOBRIEF (Nov. 2008) available at http://unfccc.int/files/methods_science/redd/application/pdf/financing_redd.pdf.

179. See *supra* note 163 and accompanying text.

180. This is consistent with the idea of “common but differentiated responsibilities” for environmental problems, which recurs throughout most environmental treaties, including the UNFCCC. See United Nations Framework Convention on Climate Change, Art. 3 (U.N. 1992).

only crucial to the effectiveness of the overall program, but is also an important aspect of political viability in many developing forest nations.¹⁸¹ However, upfront financing also requires increased monitoring of activities to ensure compliance with the IFCS program, thus increasing transaction costs.¹⁸²

Currently, several bilateral and multilateral initiatives are addressing some of the developing nations' upfront finance needs. The World Bank's Forest Carbon Partnership Facility, for example, is working with several developing countries to measure forest carbon stocks and emissions rates, as well as providing assistance with policy and program implementation.¹⁸³ Similar efforts are also underway through the UN-REDD program¹⁸⁴ and through bilateral programs funded by the governments of Norway and Japan.¹⁸⁵ In addition to providing valuable

181. Many developing countries see climate change as a problem caused by the developed world, and that developed countries need to take the lead in addressing climate change in ways that allow poor countries to continue economic development. This is the basic negotiation stance of the Group of 77, the largest coalition of developing countries within the UN. See MIKE SHANAHAN, INTERNATIONAL INSTITUTION FOR ECONOMIC DEVELOPMENT NOVEMBER 2009 BRIEFING 2 (2009), available at <http://pubs.iied.org/pdfs/17074IIED.pdf>. Developing countries' REDD proposals have consistently reflected this position on responsibility for climate change. For example, the coalition proposal calls on the international community to mobilize donor funds both for REDD readiness activities, and for financing actual market-based REDD activities. See Coalition Proposal, *supra* note 22, at 3–4. An IFCS program that does not provide some degree of upfront financing is unlikely to receive significant support or participation from developing countries.

182. This can be seen in the current work of the World Bank's Forest Carbon Partnership Facility, which provides REDD-readiness funding and anticipates providing upfront financing for REDD activities in the future. To participate in the FCPF, countries must report annually on activities and keep the FCPF informed about activities. See generally Charter Establishing the Forest Carbon Partnership Facility, Int'l Bank for Reconstruction and Dev., Art. 16, (Mar. 17, 2010), available at http://www.forestcarbonpartnership.org/fcp/sites/forestcarbonpartnership.org/files/Documents/PDF/Mar2010/Charter-March17_2010_clean.pdf.

183. Thirty-seven developing countries are involved in the Partnership, which assists countries with forest management and provides countries with payments for emissions reductions. See WORLD BANK, FOREST CARBON PARTNERSHIP FACILITY (2010), available at <http://www.forestcarbonpartnership.org/fcp/sites/forestcarbonpartnership.org/files/Documents/PDF/Nov2010/FCPF%20one%20pager%2011-21-10%20.pdf>

184. The UN-REDD program builds on FAO expertise in forest management and assists twenty-nine developing countries to prepare and implement national forest strategies. The UN-REDD program is funded by several developed countries, primarily Norway. See *About the UN-REDD Programme*, UN-REDD.ORG, <http://www.un-redd.org/AboutUN-REDDProgramme/tabid/583/Default.aspx> (last visited Feb. 18, 2012).

185. In addition to providing funding for the UN-REDD program, the government of Norway provides bilateral assistance to forest nations such as Indonesia and Tanzania to improve these countries' ability to manage forests for emissions reductions. See *What does the Norwegian Climate and Forest Initiative Finance?*, REGJERINGEN.NO, <http://www.regjer->

lessons about how to implement IFCS programs, these efforts may be able to minimize the need for upfront financing during actual IFCS program implementation, at least for developing nations already involved in these projects. Nonetheless, upfront finance needs may be substantial.

Institutional arrangements for upfront financing have very different needs than institutional arrangements for negotiation support. For finance institutions, the most important determinants of success will be their effectiveness, particularly their ability to reach the intended recipients of funding, and their ability to minimize costs and maintain financial sustainability.¹⁸⁶ The political viability of these institutions is important to a degree, since important forest nation participants must trust these institutions. The legal status of these institutions is less important, however, as long as they can effectively distribute necessary funds.

Finally, all three IFCS programs will need to consider developing nations' need for initial financing of some forest carbon programs, particularly in nations where significant investment will be needed to increase national capacity to implement these programs and policies.¹⁸⁷ However, these financing arrangements necessarily involve the risk that, despite investment in capacity, the country will be unable to implement programs and policies that result in carbon savings due to circumstances beyond a country's control, such as natural disaster or illegal deforestation. As with the risk of natural disaster, institutions will be needed to allocate these risks among the parties in such a way that balances the high-powered incentives of risk bearing with the political need to minimize the amount of excess burden placed on developing countries who can least afford to bear it.

Upfront financing needs of developing nations present a unique and challenging situation. In many cases, a nation's upfront financing needs may not directly relate to forests per se. Their financing needs will, however, include investments in judicial, agency, and education systems

ingen.no/en/dep/md/Selected-topics/climate/the-government-of-norways-international-/what-do-we-finance.html?id=557700 (last updated July 30, 2010). Japan is the world's largest source of bilateral forest management funding, providing grants, low-interest loans, technical assistance, and funding for forest management partnerships in Asia. See *International Cooperation of Japan to Promote Sustainable Forest Management in Developing Countries*, MOFA.GO.JP (Nov. 21, 2003), <http://www.mofa.go.jp/policy/environment/forest/coop0211.html>.

186. Jacob Yaron, *What Makes Rural Financial Institutions Successful?*, 9 WORLD BANK RESEARCH OBSERVER 49, 49 (1994).

187. For useful information about REDD upfront finance needs and potential mechanisms, see *id*; Dutschke & Wertz-Kanounniko, *supra* note 178; MARKKU SIMULA, REDD FINANCE MECHANISMS (2009), available at http://unfccc.int/files/methods_science/redd/application/pdf/tfd-redd-finance-background-paper.pdf (providing essential background information for participants in international forest dialogue meetings).

needed to implement forest programs and policies.¹⁸⁸ Thus, these investments will tend to be most important in the early years of the program and are likely to yield benefits beyond the IFCS program itself. Nonetheless, the investments themselves may not be capital-intensive or provide readily measurable returns on investment. As a result, developing nations may have difficulty accessing funds through ordinary finance channels, making financing through the IFCS program itself an attractive option.

The problems with upfront IFCS financing are similar to the problems related to natural disaster.¹⁸⁹ In any financing arrangement, risk must be shared between finance providers recipients.¹⁹⁰ The precise allocation of risk between these parties needs to provide the recipient with incentive to use funds wisely, but avoid placing heavy burdens on developing nations.

In the IFCS context, financing could be arranged in the form of early payments to forest nations for IFCS credits.¹⁹¹ Under such a system, the early payment would need to be sufficient enough to provide needed investment, but small enough so that the anticipated final payment provides sufficient incentive for the forest nation to continue maintaining forests and participating in the IFCS program. Such a system would work best where there is an intermediary institution to aggregate buyers and connect them with IFCS credits, since it would allow a single institution to determine how much upfront financing to provide, advance the appropriate amount of funding, and allocate risk among the various buyers.¹⁹² However, this approach would work only for nations whose total anticipated payment is significantly higher than their upfront finance needs. If nations do not anticipate that they will receive the re-

188. Implementation of forest programs and policies requires good forest governance, including institutional capacity, accountability, and public participation. See generally WORLD RESOURCES INSTITUTE, THE GOVERNANCE OF FORESTS TOOLKIT: A DRAFT FRAMEWORK OF INDICATORS FOR ASSESSING GOVERNANCE OF THE FOREST SECTOR (2009), available at http://pdf.wri.org/working_papers/gfi_tenure_indicators_sep09.pdf.

189. See discussion of risk bearing, *infra* Part IV.C.

190. See *infra* note 191.

191. This is an option that might work particularly well where upfront costs are high. See SVEN WUNDER, NECESSARY CONDITIONS FOR ECOSYSTEM SERVICE PAYMENTS 5 (2008), available at http://www.rff.org/documents/08_tropics_conference/tropics_conference_papers/tropics_conference_wunder_pes_markets.pdf.

192. This is the approach that seems likely to emerge from the World Bank's Forest Carbon Partnership Facility, which has established a Carbon Fund to provide upfront financing to participating nations. See *supra* note 78 and accompanying text. Currently, donors contribute to the fund, but the same approach could be adapted used to arrange financing between buyers of IFCS credits and forest nations.

maintaining balance of payments, they may have little incentive to continue to participate.

Another option to provide the upfront financing is to offer low-cost loans to developing countries, either through existing institutions such as the World Bank, through some of the IFCS funds that have begun to emerge post-Copenhagen, or by a small levy on the sale of emissions credits. Under this approach, developing nations and loan institutions could negotiate loan terms that allocate risk among the parties accordingly. However, this approach could be politically difficult among developing nations who already bear significant debt burdens.

A final option for providing this funding is through direct donation by developed countries. This approach removes risk to developing nations, although the amount of funding available may be limited by donor willingness to invest in national capacity-building efforts without certainty that these efforts will be successful. This is currently the predominant approach to upfront IFCS finance needs, although it is not clear whether this approach will be sufficient to finance a comprehensive, global IFCS agreement. Some countries, such as Norway and Indonesia, have established bilateral partnerships in which a developed country provides funding and other assistance directly to a developing forest nation.¹⁹³ In other cases, developed nations have contributed or pledged to contribute to multilateral funds managed by entities such as the World Bank, which in turn are used to improve developing country readiness through programs such as the Forest Carbon Partnership.¹⁹⁴

B. Enhancing Credible Commitment and Decreasing Strategic Withdrawal

Credible commitment problems arise when parties to a transaction, such as the participants in an IFCS program, make promises that are contrary to their future interests.¹⁹⁵ This is especially a problem when one party makes a substantial investment in support of the transaction, as in the case of a forest country committing substantial resources to expand forest carbon sequestration.

Under any IFCS scheme, participants will likely discover situations in which they would benefit from disregarding their commitments. For example, a nation that has received up front financing to invest in forest programs and then faces a drought that reduces forest area might decide to exit the program rather than continue to invest in its forests

193. See, e.g., *supra* note 185.

194. See *supra* note 72 and accompanying text.

195. See WILLIAMSON, *supra* note 89, at 163.

and face little or no reward at the end of the compliance period. Moreover, when the nation exits the program, it might decide to encourage increased deforestation to take advantage of high timber prices resulting from other nations' participation. Commitments, of course, run in both directions. If forest nations are to remain in the program even when opportunities emerge that would reward defection, donor nations must also make credible commitments to reward those efforts at the end of the compliance period.¹⁹⁶

Collective action problems can become a common problem in the IFCS scheme because the economically rational course of action for most nations is to agree to participate and then follow with noncompliance. One way to address collective action problems in the common pool resource sector is through careful monitoring of individual performance.¹⁹⁷ This assures participants that others are meeting their stated obligations. This strategy has generally been effective when done among parties that share a single common pool resource and can easily monitor each others' performance.¹⁹⁸ However, this strategy is also used internationally to monitor national implementation of treaty obligations, particularly obligations that are input-based or qualitative in nature. For example, the IMF has developed a "bilateral surveillance" approach to monitor individual countries' performance at meeting their IMF obligations. Under this approach, representatives from several IMF nations periodically undertake a rigorous and transparent review of each country's implementation of IMF policies.¹⁹⁹ Notably, this process is separate from enforcement and dispute resolution, and instead serves as an opportunity to exchange information among all IMF parties.

Performance monitoring also increases the visibility of noncompliance.²⁰⁰ Visibility alone can provide parties with an incentive to honor their own commitments, because so much of international cooperation and treaty compliance is based on honor and reputation, and no country wants to admit in an international forum that it did not keep its promises. Hence, monitoring provides a vehicle for applying moral pres-

196. See WILLIAMSON, *supra* note 89, at 163.

197. See *supra* note 29, at 185–86.

198. See *supra* note 29, at 185–86.

199. See Armin Shafer, *A New Form of Governance? Comparing the Open Method of Coordination to Multilateral Surveillance by the IMF and the OECD*, 13 J. EUROPEAN PUB. POL'Y 70, 75–76 (2006) (describing the surveillance procedure as hybrid between monitoring and peer pressure, in which IMF officials prepare extensive reports on countries' implementation and activities for multilateral review by all IMF members).

200. Indeed, the main outcome of the IMF process described above is to increase transparency by ensuring that all members are aware of other countries' degree of compliance. *Id.* at 81.

sure for what is essentially voluntary compliance.²⁰¹ Of course, reputation alone may not be a sufficient incentive once there are substantial resources at stake, such as the payments from a fund or income from emissions allowance sales.²⁰² In that case, performance monitoring is necessary to provide legal recourse to the international community. Even though a legally binding instrument such as the Kyoto Protocol may not be completely effective at compelling countries to keep their promises,²⁰³ making noncompliance visible will at least marginally increase countries' inclination to continue cooperation.

An alternative to performance monitoring is to monitor performance inputs as an indicator of eventual performance. Donor nations, for example, may want to monitor forest nations' progress in capacity building and implementing forest project and programs. Existing institutions, such as the World Bank's Forest Carbon Partnership Facility, might provide some of the monitoring related to national capacity building and policy implementation.²⁰⁴ Alternately, institutions that provide measurement and verification²⁰⁵ or a monitoring program such as the IMF's bilateral surveillance system²⁰⁶ can be used to monitor forest nations' interim progress. Any of these approaches will, however, raise the transaction costs of the approach.

Since performance and input monitoring alone may not be sufficient to ensure credible commitment and prevent strategic withdrawal, IFCS programs should also be designed to provide participants with sufficient incentives to remain in the system long-term. One way to align parties' interests with long-term participation is for the promisor to provide a bond or hostage that is valuable enough to assure delivery or per-

201. Robert Hahn & Kenneth Richards, *The Internationalization of Environmental Regulation*, 30 HARV. INT'L L.J. 421, 436 (1989).

202. The risk that international investment funds will be misused or expropriated is not new. A substantial literature discusses these problems and mechanisms to prevent them. See J. Martin Wagner, *International Investment, Expropriation and Environmental Protection*, 29 GOLDEN GATE U.L. REV. 465 (1999).

203. Several countries have been found non-compliant with various aspects of the Kyoto Protocol, even after ratifying the treaty. The UNFCCC's Enforcement Branch has initiated formal actions against Canada, Bulgaria, Greece, and Croatia for noncompliance with the Protocol. See *Questions of Implementation*, UNFCCC.INT, http://unfccc.int/kyoto_protocol/compliance/questions_of_implementation/items/5451.php (last visited Feb. 18, 2012).

204. The FPCF already engages in similar activities, working with participating countries to build institutional capacity and requiring countries to report annually on progress and activities. See *supra* note 195.

205. See *infra* Part V.

206. See *supra* Part IV.B.

formance.²⁰⁷ In the case of participants in an IFCS program, that bond could be their future funding from the World Bank, their participation in the WTO, or some other privilege that the country enjoys but that can be revoked by the international community.²⁰⁸

Another mechanism to align parties' incentives and provide credible commitments is to release rewards over time. For example, under the Brazilian model, payments from the fund for carbon sequestration gains could be structured to pay out over time, contingent on continued performance. Similarly, under the PINC approach, if countries are due significant allotments of allowances at the end of the first applicable compliance period, those allotments can be released in a phased pattern over several years. If a country appears to be headed to for a debt (i.e., loss in carbon stock) during the next period, then the release of allowances can be delayed, serving as a type of performance bond.

If positive incentives to stay in the system are inadequate, the IFCS program could impose consequences for leaving the system by including terms for withdrawal in the IFCS treaty. The Protocol offers a useful model for limiting defection. A party may leave the ozone treaty, but only after four years' participation and one years' notice to other

207. Oliver Williamson, *Credible Commitments: Using Support Exchange*, 73 AM. ECON. REV. 519 (1983).

208. While this approach could prove highly effective, revoking such privileges may be at odds with the goals and obligations of these institutions. For example, the WTO's defining purpose is to improve economic growth and sustainable development through trade liberalization, as seen in the preamble to the Marrakesh Agreement Establishing the World Trade Organization. Marrakesh Agreement Establishing the World Trade Organization, Preamble, Apr. 15, 1994, 1867 U.N.T.S. 154. While an IFCS program is not at odds with these goals, providing enforcement for an IFCS agreement is outside the scope of the WTO's mission, and the WTO is not legally authorized by its members to take on such a role. It should be noted that WTO membership is an unlikely hostage for assuring compliance with an international environmental treaty. The WTO is legally obligated to abide by its formative treaties and subsequent agreements. The current WTO agreement does not allow a member's status to be revoked due to noncompliance with another treaty, and changing WTO rules to allow this kind of revocation is unlikely, considering that WTO decisions are made by consensus. See *General Agreement on Tariffs and Trade*, Art. IX (1947), available at http://www.wto.org/english/docs_e/legal_e/gatt47_01_e.htm (last visited Mar. 4, 2012). The World Bank may have more leeway than the WTO to make aspects of Bank participation contingent upon IFCS performance, but the Bank is likely to do so only to the degree that providing a hostage for an IFCS program is consistent with its goal of poverty reduction and articles and by-laws that guide its everyday operations. In either case, the relevant institution would need to agree to provide an appropriate hostage before this approach could be used to ensure countries' continued performance in an IFCS program.

parties that it intends to withdraw.²⁰⁹ Parties must seek approval from other parties before withdrawing, but they are allowed to withdraw for justifiable reasons that include changed circumstances or frustration of purpose.

This approach to discouraging defection allows countries to voluntarily relinquish their right to defect. As a practical matter, it also means that discouraging defection and committing to long-term participation will be addressed in the initial negotiation process itself—a process that could be ongoing as parties periodically recommit to another compliance period in the program and re-negotiate program terms as needed. Thus, the institutions needed to avoid defection are closely related to the institutions needed to negotiate participation in the first place.

The complexity of the credible commitment problem differs somewhat under the three IFCS programs. Under the Brazilian model, forest nations do not need to pre-commit to specific reductions and donor nations do not need to commit to particular finance levels, so performance monitoring will be relatively simple—perhaps simple enough to combine with forest carbon measurement and verification services.²¹⁰ However, forest nations will need a credible commitment from the international community that the agreed-upon carbon price will be payable at the end of the compliance period. If the forest carbon fund is large enough at the outset of the program to pay all forest nations for their expected carbon savings, this will be seen as a credible commitment.

For their part, donor nations may be willing to supply this full amount without a credible commitment on the part of forest nations that the expected savings will be realized. As a result, both donor nations and forest nations are likely to make modest initial commitments, and then increase these commitments over time and in response to changing conditions. Forest nations, for example, might devote some initial amount of resources to reducing deforestation, and then commit to additional efforts after successfully receiving initial payments. Because the resources at stake are high, honor and reputation are unlikely to provide credible commitments; instead, credible commitments will be better provided through monitoring inputs and releasing rewards over time.²¹¹ As parties

209. See UNITED NATIONS ENVIRONMENT PROGRAM, HANDBOOK FOR THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER 22 (2009), available at http://ozone.unep.org/Publications/MP_Handbook.

210. Without pre-commitment, there is little need to monitor compliance until the end of the compliance period, when countries will be rewarded for their performance or debited for their lack of performance. See Brazil Proposal, *supra* note 21, at 24.

211. Monitoring is generally seen as crucial to overcoming collective action problems, since participants have greater incentive to comply when all participants can observe

gain trust in the program over time, they may also become more willing to be bound to their promises through use of a hostage—an approach that will almost certainly require near consensus of the parties to whatever international agreement is used to provide that hostage.

Under the Coalition or PINC approaches, however, significantly more oversight will be needed to provide credible commitments. In the Coalition and PINC models, donor nations' carbon emissions obligations provide a credible commitment that they will be willing to purchase forest carbon credits. With these models, however, forest nations will need a credible commitment on the part of the international community that these obligations are stringent enough to create demand for forest credits, and that they will be imposed and enforced long enough into the future to make current investment in forests worthwhile. A monitoring institution will need to gather information about countries' IFCS investments and progress toward expected goals, and provide this information to appropriate entities that can anticipate potential problems and, where possible, intervene with rule changes, technical assistance, or enforcement actions where necessary.

In addition to performance monitoring, the use of national reputation and the use of hostages might be more effective and politically viable options for the PINC and Coalition models. However, because countries can often withdraw from treaties at will, the use of input monitoring and phased payments are needed to provide accountability and positive incentives for countries to follow through on their commitments.²¹² In addition, since buyer nations may face more stringent emissions reduction requirements under these models, these nations will

others' noncompliance. See SCOTT BARRETT, *ENVIRONMENT & STATECRAFT: THE STRATEGY OF ENVIRONMENTAL TREATY-MAKING* 37 (2003) (describing how monitoring was used to observe and thus enforce a treaty banning pelagic sealing between the U.S., Russia, and Japan). Where "soft law" treaties limit the degree to which they bind participants, honor and reputation may be sufficient to induce compliance and provide credible commitments for others to comply. See Hudec, *supra* note 164. When treaties require countries to take actions that have economic consequences, however, credible commitments will require more monitoring and positive or negative incentives to induce and demonstrate compliance.

212. Withdrawal from treaties is often dictated by the terms of the treaty. The Kyoto Protocol, for example, allows parties to withdraw at any time, provided the country has been a party for at least three years and provides one year's notice. See Kyoto Protocol, *supra* note 25, at Art. 27. For treaties that do not directly address withdrawal, the Vienna Convention on the Law of Treaties identifies circumstances in which a country may withdraw from a treaty—for example, if the treaty terms are in breach or due to fundamentally changed circumstances. See Vienna Convention, *supra* note 77, Art. 42, 54, 56, available at http://untreaty.un.org/ilc/texts/instruments/english/conventions/1_1_1969.pdf. The Vienna Convention does not address the legal consequences or remedies that might result from unilateral withdrawal not in accordance with international law, however, leaving the question of exactly how free countries are to withdraw open to debate. See Laurance R.

need a credible commitment from forest nations that the credits will be available when needed. For these models, connection to a long-term, legally or politically binding international climate change regime could provide the needed credible commitment.

Finally, under any approach steps must be taken to ensure that even with upfront financing, countries receive a significant benefit only at the end of the compliance period when they can demonstrate that they have achieved carbon savings.²¹³ This approach needs to be combined with some sort of insurance or risk-sharing system to ensure that nations facing natural disaster will not be forced to bear all of the risk, since a risk bearing system that places all of the burden on forest nations will encourage, rather than discourage, defection, at least among developing countries.

C. Risk Bearing

In addition to credible commitments, all three IFCS programs need institutions to address risk of forest carbon losses from natural disasters or human intervention that appropriately allocate risk between forest nations and the international community. The appropriate allocation of risk among the IFCS parties should depend upon whether any parties are able to prevent the disaster and which parties are best able to absorb risk-related losses.²¹⁴ Forest nations in the developing world are likely to be ill-prepared to absorb loss of investment in forest programs and policies, and as a political matter the international community has repeatedly stated that developing nations' needs for economic development should be respected.²¹⁵ However, if these nations are not required to bear any risk, they will have little incentive to aggressively prevent

Helfer, *Exiting Custom: Analogies to Treaty Withdrawals*, 66 DUKE J. COMP & INT'L LAW 65, 79–80 (2010).

213. This is necessary to ensure environmental integrity; if countries receive significant payments without achieving significant carbon savings, then the program will not have achieved its environmental goals. *See supra* note 98.

214. Economists prefer to allocate at least some portion of risk to individuals that are in a position to prevent that risk—for example, by requiring holders of insurance policies to have a co-pay or deductible that encourages them to prevent risk. *See* Steven Shavell, *On Moral Hazard and Insurance*, 93 QUARTERLY J. ECON. 541, 541 (1979). However, with an IFCS program, there is also the concern that developing forest nations may not be in an economic position to bear large-scale financial losses. Effective risk allocation must consider both of these aspects.

215. The principle that developing nations share “common but differentiated responsibilities” for environmental problems recurs throughout most environmental treaties, including the UNFCCC. *See* United Nations Framework Convention on Climate Change, *supra* note 180, Art.3.

catastrophic losses from forest fires and insect infestations, which may be preventable through silvicultural management.²¹⁶

The issue of risk allocation becomes more complex under the Coalition and PINC models. Since these models link forest carbon credits to emissions trading, any unexpected carbon emissions due to natural disasters could have significant impacts on the entire carbon program. The Coalition model expressly exempts natural disasters from the IFCS program, with the result that such disasters could contribute unaccounted-for carbon emissions and undermine the entire program.²¹⁷ This amounts to a de facto allocation of risk among the entire global community, with the greatest risk borne by nations who face the most detrimental impacts from climate change. It also suggests that monitoring of countries' forest management programs will be important, so that forest nations are exempt only from natural disasters that are truly beyond their control, boosting transaction costs significantly under the Coalition approach.

The PINC model, in contrast, requires countries to account for all carbon losses and gains, regardless of whether the cause is natural or anthropogenic. This approach reduces transaction costs by reducing the monitoring need under the Coalition approach. To illustrate this savings, consider a forest that has sustained losses from a pest transported by human visitors. Now suppose that the year following the pest outbreak, the forest is further weakened by abnormally dry conditions, and carbon storage is substantially reduced. Under the Coalition approach, it may be difficult to determine how much of the carbon losses were due to natural causes. The PINC approach avoids this problem by simply counting the entire loss. However, this approach requires forest nations to bear all risk of losses from natural disaster unless other institutional arrangements are made.

Under the Brazil and the Coalition models, risk might be reallocated so that both parties share the risk of natural disasters, perhaps by reducing, but not eliminating, the carbon price paid to forest nations that have experienced natural disaster. This approach would be helpful in the case of natural disasters in which the forest nation has some ability to prevent the disaster from occurring; risk sharing would give the forest

216. On the concept of designing contractual arrangements for efficient risk bearing generally, see GEORGE G. TRIANTIS, UNFORESEEN CONTINGENCIES: RISK ALLOCATION IN CONTRACTS (1999), available at <http://encyclo.findlaw.com/4500book.pdf>; for an excellent summary of efficient risk bearing in tort see Michelle J. White, *The Economics of Accidents*, 86 MICH. L. REV. 1217 (1988).

217. The proposed REDD mechanism is designed to reduce deforestation and forest degradation, both of which are defined by the UNFCCC as human-induced activities. See Coalition Proposal, *supra* note 22, at 8. As a result, these disasters will add carbon to the atmosphere that is not accounted for elsewhere in the carbon trading system.

nation an incentive to prevent the problem. However, this approach will involve determining whether a natural disaster is preventable, an exercise that could prove difficult, time-consuming, and highly political. In addition, members of the international community might object to imposing any financial burden on developing nations that have recently experienced an unintended carbon stock loss, such as through catastrophic forest fire. This approach should only be taken if the benefits from providing incentives for prevention outweigh the political costs.

An alternative option is to pool risk. One possibility is to make any payment to forest nations contingent upon the overall success of participating nations. Thus, no nation would be rewarded unless participants had together achieved some amount of carbon savings. This would ensure that donor nations receive at least some benefit, and might provide some risk management incentive to forest nations. However, it would decrease individual country accountability, diminish the credible commitment provided to forest nations, and might discourage participation. This approach would only be possible under the Brazil model, which is not connected to a broader carbon market.

Under the Coalition or PINC models, risk pooling could take the form of a carbon credit set-aside program.²¹⁸ Under such a program, a small percentage of all carbon credit sales would be removed from the market and set aside as insurance against natural disasters. The cost of setting aside credits could be placed upon forest nations, donor nations, or shared between both. Similarly, the credits could be used to ensure that the forest nation is fully compensated despite the natural disaster, simply retired to protect the environmental integrity of the carbon market, or allocated so that forest nations and the international community both share in the benefits and risks of the program. As with other risk-sharing arrangements, the forest nations will have incentives to prevent disasters only if they share in some amount of the risk, but developing forest nations can only share in the risk to the degree that the international community agrees is equitable.

V. INSTITUTIONS TO SUPPORT COUNTRY READINESS

Under each of the three IFCS models the unit of analysis is the nation itself.²¹⁹ This means that the changes in carbon flows or stocks are measured at the national level. This in turn implies that national govern-

218. For a discussion of carbon credit pooling and other risk management options for REDD, see Michael Dutschke & Arild Angelson, *How Do We Ensure Permanence and Assign Liability*, in *MOVING AHEAD WITH REDD* 2008 83 (Arild Angelson ed., 2008).

219. There are some variations on the REDD proposal that evaluate changes at the regional or even project level. However, the generic trend in the literature and discussions

ments must take the lead to induce domestic changes, track their progress, and determine how the rewards for success (payments in the case of the Brazilian model, marketable carbon allowances in the case of the REDD and PINC proposals) are distributed. Not all nations are ready to take on and succeed with these new responsibilities.

The first step for virtually all countries participating in an IFCS program will be to develop, implement, and enforce policies to slow deforestation, increase forest expansion, and manage forests for increased carbon sequestration, as well as develop the capacity to measure and monitor changes in forest carbon.²²⁰ Given the poor track record that some countries have experienced,²²¹ there may be a place for organizations such as the UN, the World Bank, international NGOs, and policy research centers to advise countries on options for developing effective forest policies.

Countries will also have to develop at least some internal forest science capacity to evaluate their programs and to track changes in forest sequestration. Depending upon the design of the international monitoring system,²²² countries may also require substantial capacity building before they can confidently and successfully participate in an IFCS program.²²³ Options to develop internal forestry skills, particularly in developing countries, include expansion of funding for schools of forestry around the world, investment by the World Bank, and bilateral funding by donor nations. It might also be possible to build training programs into the design of the IFCS program itself.

Finally, and perhaps most intractable, it will be important for countries to have domestic accountability for the management of re-

represents an increasing awareness that the national level approach has several advantages. *See, e.g.,* PARKER ET AL., *supra* note 11, at 83.

220. Indeed, much of the work of the World Bank's Forest Carbon Partnership Facility has focused on these tasks, and the FCPF worked with several countries to develop "Readiness Preparation Proposals" to that develop plans for improving REDD readiness. *See* FOREST CARBON PARTNERSHIP FACILITY, REDD READINESS PREPARATION PROPOSAL FOR UGANDA 14 (May, 2011), available at http://www.forestcarbonpartnership.org/fcp/sites/forestcarbonpartnership.org/files/Documents/PDF/Jun2011/Uganda%20Revised%20RPP%20May%2031,%20%202011_0.pdf (identifying priority objectives for Uganda, including development of strategies to address drivers of deforestation, sustainable forest management practices, and monitoring capabilities).

221. *See* E.B. Barbier, *The Economics of Tropical Deforestation*, 15 J. OF ECON. SURVEYS 413 (2001).

222. *See* discussion *infra*, Part IIIA.

223. For more information on building capacity in developing nations' forestry sectors see, e.g., TOMI TUOMASJUKKA, FOREST POLICY AND ECONOMICS IN SUPPORT OF GOOD GOVERNANCE: EUROPEAN FOREST INSTITUTE PROCEEDING NO. 58 (2010), available at http://www.efi.int/files/attachments/publications/efi_proceedings_58_net.pdf.

sources—both forest and financial. An expansive IFCS program could represent a substantial new source of funding for a number of countries. As recent events in Liberia demonstrate, even the largely voluntary carbon offset market that is in place today may have induced substantial graft and misappropriation.²²⁴ Moreover, even where there are legitimate national programs based on international incentives, it will be necessary for government officials to manage the IFCS payments from the fund (Brazilian model) or tradable allowance market (REDD and PINC models). As the IFCS program is designed and implemented parties should at least consider steps that could be taken to increase domestic accountability for the appropriation and management of the resources involved.

VI. CONCLUSION

IFCS has significant potential to mitigate the effects of climate change and provide a much-needed funding stream to developing countries. The success of IFCS, however, will depend to a large extent on the institutions that support activities such as negotiation, monitoring, and dispute resolution.

In this article, the authors do not recommend one particular approach to IFCS or one particular set of support institutions. Instead, the range of issues that policymakers must consider when they design and select the institutions that will implement IFCS in the months, years, and possibly decades to come are identified. A framework is presented for analysis that allows policymakers to recognize the tradeoffs inherent in any set of institutional choices, and select institutions that will support a continued role for IFCS in combating climate change.

Institutional design can have an enormous impact on the success or failure of an ambitious program such as REDD. By examining some of the aspects of each service needed to support an IFCS program, the key institutions that can make the IFCS program a successful way to reduce atmospheric carbon levels can be identified. Part of the IFCS discussion should include the characteristics of the support services needed, the way those support services relate to overall IFCS program goals, and the need for institutions to adapt over time in response to changes in the IFCS program. As the global community enters into the first phases of IFCS implementation, these considerations should be a starting place for decisions about how to invest IFCS funds and move forward with a long-term implementation program.

224. See Michael Peel & Fiona Harvey, *Police Probe as Carbon Deal Hit by Bribe Accusation*, FINANCIAL TIMES (June 4, 2010), <http://www.ft.com/cms/s/0/3e9cb276-6f47-11df-9f43-00144feabdc0.html>.

