

“The Big Trees Were Kings”: Challenges for Global Response to Climate Change and Tropical Forest Loss

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ABSTRACT:

Today, a historic opportunity appears to present itself. This is the chance to link the stabilization of the global climate with the financing of tropical forest conservation. The effort to link these two key parts of the “Global Commons” into a conservation and financing program was a key agenda item at the Copenhagen Conference, COP-15, held in December 2009. The proposal, called Reduced Emissions from Deforestation and Degradation (REDD), envisions creating marketable carbon offset rights representing the carbon content of tropical forests. These offsets would be sold to firms in the industrial world operating under emissions caps. This system would create incentives to preserve the forest, along with the funds needed to ensure implementation. Investing in natural tropical forests, under existing economic and social conditions, is generally not attractive. In most tropical nations, poor governance and contested property rights are barriers to investment. Future population pressures are also likely to intensify. Western Europe has had experience in managing complex, highly fragmented, and poorly documented forest rights: the forest use rights of medieval times. The fact that adjusting them to modern needs took centuries and generated se-

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vere conflict reminds us how difficult massive changes in customary rights can be. Thoughtful study of this experience could generate ideas for managing transitions in tenure rights in the tropical world. From a legal standpoint, a sale of a carbon right in a forest is an exceptionally complex transaction in real property. The frustrations of at Copenhagen reflect the bedrock fact that saving tropical forests is complicated. The prospect REDD can deliver early progress on saving tropical forests should be viewed as an untested hypothesis. Achieving REDD-readiness is likely to be a work of decades if not generations.

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“Going up that river was like travelling back to the earliest beginnings of the world, when vegetation rioted on the earth and the big trees were kings. An empty stream, a great silence, an impenetrable forest.”¹

– Joseph Conrad, *Heart of Darkness*

I.

INTRODUCTION

At the United Nations Conference on the World Financial and Economic Crisis and Its Impact on Development, General Assembly president, Dr. Ali Abdussalam Treki, urged his listeners to consider:

[T]he Earth’s biosphere as the common heritage of all life, with humanity as its guardian. It belongs to the common good of humanity and the Earth, as stated at the 1972 United Nations Conference on the Human Environment. . . The same can be said of forests, especially tropical and sub-tropical forests, where the greatest biodiversity and humidity necessary to Earth’s vitality are concentrated. . . ²

That the atmosphere is a Global Commons is self-evident. There exist no property rights to the atmosphere.³ No national claims, other than overflight rights, are asserted by individual nations, and these claims are based on land boundaries only. The forest, however, is not obviously a Commons. Instead, over history, forests have been treated in law and policy as simply an-

1. JOSEPH CONRAD, *HEART OF DARKNESS* (Barnes & Noble Classics 2003) (1902).

2. Ali Abdussalam Treki, President, United Nations, Remarks at the Opening Session of the United Nations Conference on the World Financial and Economic Crisis and Its Impact on Development (June 24, 2009), *available at* <http://www.un.org/ga/president/63/statements/econferenceopen240609.shtml>.

3. Overflight rights, air rights over real estate, licenses to emit air pollution, and even rights to the electromagnetic spectrum might seem to be exceptions to this broad statement, but none deals with the atmosphere itself or its constituents such as carbon dioxide.

other form of real estate, as property subject to ownership by sovereigns, institutions, individuals, communities, or corporations, as local cultures and situations warrant.

Today, many are joining Dr. Abdussalam in asserting that the remaining tropical forest should be treated as a Global Commons.⁴ Recent events have generated extensive press interest in climate issues and the potential role of forests.⁵ Governments of major tropical nations, however, have not always welcomed this perspective. Instead, many saw it as a form of neo-colonialism designed to control their resources and bar them from developing employment, industry and trade. They found it especially galling, since many of the industrial nations describing tropical forests as a “global heritage” had only recently finished destroying much, if not all, of their own primary forest.

These two Commons are linked. They are linked because the world’s forests contain more carbon than does the atmosphere.⁶ The forests and marshes of the past gave rise, following millions of years of geological conversions, to the oil, gas, and coal that fuel the modern industrial age. Today, the clearance of tropical forests is believed to contribute about 12% of total carbon emissions to the atmosphere every year.⁷

This essay breaks no new theoretical ground. Rather, it explores some major challenges and barriers to implementing programs to preserve and manage the tropical forest as a common heritage of humankind. In particular it focuses on what is required to retain tropical forests. Section II sketches the current forest conditions in the tropics and discusses why sustainable management is not being achieved. Section III appeals to history and economic theory for ideas. Accepted criteria for success in

4. A Google search of the term “Atmosphere as global commons” yields 260,000 results. The Millennium Development Goals include environmental sustainability. U.N. DEP’T OF ECON. & SOC. AFFAIRS, MILLENNIUM DEVELOPMENT GOALS REPORT, U.N. Sales No. E.09.I.12 (2009). See also Robert N. Stavins, *The Problem of the Commons: Still Unsettled after 100 Years*, 101 AM. ECON. REV. 81 (2011).

5. See, e.g., Joel Kurtzman, *The Low-Carbon Diet: How the Market Can Curb Climate Change*, FOREIGN AFFAIRS, Sept.–Oct. 2009, at 114, 120-121; *What Needs to Change*, ECONOMIST (SPECIAL ISSUE: GETTING WARMER), Dec. 5, 2009, at 1, 22.

6. See U.N. FOOD & AGRIC. ORG., GLOBAL FOREST RESOURCES ASSESSMENT 2005: PROGRESS TOWARDS SUSTAINABLE FOREST MANAGEMENT, FORESTRY PAPER 147, at xvi and xvii (2006) (noting that the globe’s forests contain 283 gigatons of carbon; this amount declined by 1.1 gigatons annually from 1990 to 2005).

7. G.R. Van Der Werf et al., *CO₂ Emissions from Forest Loss*, 2 NATURE GEOSCI. 737, 738 (2009) (estimates as high as 20% are found in the literature; this recent report makes a case for the 12% figure).

managing common property resources are compared to the concrete conditions now existing in most tropical forest nations today. This turns out to be a sobering exercise. It next looks to experience in Medieval Europe in managing forest use rights that resemble customary rights in existence in many tropical forest areas today. This excursion into past history illustrates how long it takes and how difficult it is to remodel complex and fragmented systems of use rights. Section IV offers general observations about the Copenhagen Climate summit and major policy problems to be faced, as well as a listing of what may be termed the programmatic puzzles to be addressed.

The concluding Section V closes with the assertion that the feasibility of a program like REDD remains an untested hypothesis. Unless dramatic and rapid policy learning is accompanied by equally dramatic governance and tenure reforms, the chances of the hypothesis working out favorably in practice are low. The obstacles lie primarily in the massive economic and social challenges of achieving REDD-Readiness in these nations.

II.

CARBON RIGHTS AND TROPICAL FORESTS

A. *What Is REDD?*

REDD, which is an acronym for Reduced Emissions from Deforestation and Degradation,⁸ refers to a program under development by the signatories to the Kyoto protocol.⁹ This initiative was proposed by rainforest nations to link forest preservation with the global carbon cycle. The concept is that by conserving tropical forests, the CO₂ contained in them can be retained in place, and prevented from further increasing the carbon content

8. *Deforestation* means converting land use from forest to another use with a tree cover less than 10%; *degradation* refers to actions that reduce the forest's volume, value, or ecological functions. For specifics and an overview, see U.N. FOOD & AGRIC. ORG., *TROPICAL FOREST MANAGEMENT TECHNIQUES: A REVIEW OF THE SUSTAINABILITY OF FOREST MANAGEMENT PRACTICES IN TROPICAL COUNTRIES* (1999), available at <http://www.fao.org/docrep/003/x4110e/X4110E00.htm>; Bruce Wilcox, *Tropical Forest Resources and Biodiversity: The Risks of Forest Loss and Degradation*, 46 *UNASYLVA*, no. 181, at 43-49 (1995); FLORENCIA MONTAGNINI & CARL JORDAN, *TROPICAL FOREST ECOLOGY: THE BASIS FOR CONSERVATION AND MANAGEMENT* (2005); *FORESTS AND CARBON: A SYNTHESIS OF SCIENCE, MANAGEMENT, AND POLICY FOR CARBON SEQUESTRATION IN FORESTS* (M.L. Tyrell et al. eds., 2009); GLOBAL WITNESS, *DISHARMONIOUS TRADE: CHINA AND THE CONTINUED DESTRUCTION OF BURMA'S NORTHERN FRONTIER FORESTS* (2009).

9. See *About the UN-REDD Programme*, <http://www.un-redd.org/AboutUNREDDProgramme/tabid/583/Default.aspx> (last visited Mar. 24, 2011).

of the atmosphere.¹⁰ Proposals to provide incentives for tropical forest preservation have been discussed for some time.¹¹ Industrial nations considering carbon caps have an additional reason for interest in avoided deforestation projects: research has suggested that carbon offsets based on REDD projects will be cheaper to purchase than will emissions allowances in cap and trade systems.¹² Hence, use of such offsets can reduce the cost of achieving a given level of emission reductions for emitters in industrial nations.¹³

10. See U.S. CONG. BUDGET OFFICE, ECON. & BUDGET ISSUE BRIEF, USE OF OFFSETS TO REDUCE GREENHOUSE GASES 2, 4 (2009) (discussing briefly offsets). For details and country-specific examples, see also ARLID ANGELSEN ET AL., MERIDIAN INST., REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION (REDD): AN OPTIONS ASSESSMENT REPORT: Prepared for Government of Norway (2009); GLOBAL CANOPY PROGRAMME, THE LITTLE REDD+ BOOK (2009); GLOBAL CANOPY PROGRAMME, THE LITTLE CLIMATE FINANCE BOOK (2009); KATIA KAROUSAKIS & JAN CORFEE-MORLOT, ORG. FOR ECON. CO-OPERATION & DEV., FINANCING MECHANISMS TO REDUCE EMISSIONS FROM DEFORESTATION: ISSUES IN DESIGN AND IMPLEMENTATION 17 (2007); K. LAWLOR ET AL., EXPANDING THE SCOPE OF INTERNATIONAL TERRESTRIAL CARBON OPTIONS: IMPLICATIONS OF REDD+ AND BEYOND 9 (2009); LYDIA P. OLANDER ET AL., INTERNATIONAL FOREST CARBON AND THE CLIMATE CHANGE CHALLENGE: ISSUES AND OPTIONS 8-11 (2009); ERIN C. MYERS MADEIRA, POLICIES TO REDUCE EMISSIONS FROM DEFORESTATION AND DEGRADATION (REDD) IN DEVELOPING COUNTRIES: AN EXAMINATION OF THE ISSUES FACING THE INCORPORATION OF REDD INTO MARKET-BASED CLIMATE POLICIES (2008); William F. Laurance, *Can Carbon Trading Save Vanishing Forests?*, 58 *BIO. SCI.* 286, 286 (2008).

11. For full discussion on Payments for Environmental Services (PES), see ROBERT T. DEACON, WORLD BANK, CONTROLLING TROPICAL DEFORESTATION: AN ANALYSIS OF ALTERNATIVE POLICIES (1992); Camille Rebelo, *Introduction: Financing for Forest Conservation: Payments for Ecosystem Services in the Tropics Yale ISTF Conference, March 2007*, 28 *J. SUSTAINABLE FORESTRY* 279 (2009); Martin T. Katzman & William G. Cale, Jr., *Economic Incentives for Tropical Forest Preservation: Why and How?*, 1 *J. AGRIC. & ENVTL. ETHICS* 257 (1988); Marcio Santilli et al., *Tropical Deforestation and the Kyoto Protocol*, 71 *CLIMATIC CHANGE* 267, 272 (2005).

12. How offsets will link with carbon markets is analyzed in NIELS ANGER & JAYANT SATHAYE, REDUCING DEFORESTATION AND TRADING EMISSIONS: ECONOMIC IMPLICATIONS FOR THE POST-KYOTO CARBON MARKET (Ctr. for Eur. Econ. Research, Discussion Paper No. 08-016, 2008); N. PURVIS & A. DEVENY, SUMMARY FOR POLICYMAKERS: THE GEOGRAPHY OF FORESTS IN CLIMATE SOLUTIONS (2009); MADEIRA, *supra* note 10; BRIAN MURRAY ET AL., INCLUDING INTERNATIONAL FOREST CARBON INCENTIVES IN CLIMATE POLICY: UNDERSTANDING THE ECONOMICS (2009) (containing a valuable summary of a number of analyses, with an excellent meta-analysis of various REDD supply curves, globally and regionally).

13. DOUG BOUCHIER, UNION OF CONCERNED SCIENTISTS, OUT OF THE WOODS: A REALISTIC ROLE FOR TROPICAL FORESTS IN CURBING GLOBAL WARMING (2008) (summarizing a good deal of the literature on costs). The McKinsey cost curves are widely used. See MCKINSEY & CO., IMPACT OF THE FINANCIAL CRISIS ON CARBON ECONOMICS, VERSION 2.1 OF THE GLOBAL GREENHOUSE GAS ABATEMENT COST

The term REDD initially addressed only retaining carbon stored in forests. More commonly today, the concept has been expanded to “REDD +,” which addresses social issues and sustainable development. The concept of “REDD ++” is now emerging, embracing entire rural landscapes including agriculture.¹⁴

As the Kyoto Protocol was originally being negotiated, using carbon rights in tropical forests as offsets to emissions in developing nations was considered impractical.¹⁵ One reason was that European nations doubted the credibility of long-term carbon storage by such means. Major tropical nations were opposed to international direction concerning the retention of their forests. They considered this a question of their own sovereignty and economic development. Brazil was one example.

In recent years, attitudes have shifted: many tropical nations have become aware of the benefits from retaining forests, and the costs of losing them. Costs of losing tropical forest cover a wide range of impacts from losing sources of fodder, food crops and medicinals, to losing fuelwood supplies, to damaging important watersheds, to destroying areas important for their religious or cultural values.¹⁶ Further, the possibility of compensating them for opportunity costs of forest conservation out of revenues from selling carbon credits became more appealing. The development of REDD as a serious policy option was pushed forward when a group of nations, led by Papua New Guinea and Costa Rica, formed the Coalition of Rainforest Nations.¹⁷ They urged

CURVE 8 (2010), available at http://www.mckinsey.com/en/Insights_and_Publications.aspx, search for “impact of the financial crisis on carbon economics.”

14. For more information about the Coalition, see COALITION FOR RAINFOREST NATIONS, www.rainforestcoalition.org (last visited June 12, 2011).

15. For the story of the EU ETS and forest credits, see ALEX BOZMOWSKI & CAMERON HEPBURN, *THE INTERMINABLE POLITICS OF FOREST CARBON: AN EU OUTLOOK* (2009). For a useful summary of U.S. climate policy history, see JANE A. LEGGETT, CONG. RESEARCH SERV., R40001, *A U.S.-CENTRIC CHRONOLOGY OF THE INTERNATIONAL CLIMATE NEGOTIATIONS* 15 (2011).

16. See, e.g., *ECOSYSTEMS AND HUMAN WELL-BEING: CURRENT STATE AND TRENDS* (Rashid.M. Hassan et al. eds., 2005).

17. Members of this Coalition included, according to a recent list: Argentina, Bangladesh, Belize, Cameroon, Central African Republic, Chile, Costa Rica, Democratic Republic of Congo, Dominica, Dominican Republic, Ecuador, Equatorial Guinea, El Salvador, Fiji, Gabon, Ghana, Guatemala, Guyana, Honduras, Kenya, Lesotho, Liberia, Madagascar, Malaysia, Nicaragua, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Republic of Congo, Republic of Indonesia, Samoa, Sierra Leone, Solomon Islands, Suriname, Thailand, Uruguay, Uganda, Vanuatu and Viet Nam. See Coalition Nations, COALITION FOR RAINFOREST NATIONS, <http://www.rainforestcoalition.org/nations.aspx> (last visited June 12, 2011).

the United Nations to amend its previous decision not to include Avoided Deforestation as an eligible carbon offset. At its late 2007 Bali meetings (COP-13), the UNFCCC members adopted a "Bali Action Plan" that mandated working groups to develop a program to use carbon credits to preserve tropical forests.¹⁸

Forest carbon is already being marketed around the world.¹⁹ Much of this is in the form of forest conservation projects by NGOs and governments, or early pilot trials of REDD-readiness projects. There are two broad kinds of carbon offset markets: compliance markets and voluntary markets. In the "compliance" market, a regulated entity can buy offsets to come into compliance with their emissions caps. The European Union's Emissions Trading System (EU-ETS) is at present the largest legally binding compliance market, but in that market forest-based credits are not eligible for use as offsets. In the "voluntary" market, entities purchase carbon credits for reasons unrelated to compliance with emissions caps. For example, under the EU ETS, only the largest carbon dioxide emitting industries are capped. Thus, large areas of the economy, such as buildings, professional services, and many consumer goods, are not covered by emissions caps. But firms in these sectors often want to purchase carbon offsets or credits to reduce their carbon footprint. To do this, they purchase offsets in the voluntary market.²⁰ Many American

18. See CHAD CARPENTER, U.N. DEV. PROGRAMME, ENV'T & ENERGY GRP., *THE BALI ACTION PLAN: KEY ISSUES IN THE CLIMATE NEGOTIATIONS — SUMMARY FOR POLICYMAKERS* (2008). For a detailed history as viewed by Congo Basin nations, see Altstatt Alice et al., *THE FORESTS OF THE CONGO BASIN — THE STATE OF THE FORESTS 2008* 173-190 (C. de Wasseige et al. eds., 2009).

19. KATHERINE HAMILTON ET AL., *ECOSYSTEM MARKETPLACE, STATE OF THE FOREST CARBON MARKETS 2009: TAKING ROOT AND BRANCHING OUT VIII-X* (2010).

20. See HAMILTON ET AL., *supra* note 19. For a useful legal overview see T.R. Healy, Comment, *Clearing the Air: A Course to Define the Federal Government's Role in the Voluntary Carbon Offset Market*, 61 ADMIN. L. REV. 871 (2009). There have been numerous criticisms of the concept of turning carbon into marketable offsets. There have certainly been projects that delivered low quality emissions reductions or shaky additional sequestration. Global Witness offers a harsh critique of past "industrial logging" in the tropics, sparked by worries that a REDD + program might recognize sustainable forest management in carbon accounting. Given the track records of many of these countries, these worries are not ill-founded. See GLOBAL WITNESS, *supra* note 8. Beyond that, there are those who object philosophically to the entire concept of offsets. See, e.g., LARRY LOHMANN, *CARBON TRADING: A CRITICAL CONVERSATION ON CLIMATE CHANGE, PRIVATISATION, AND POWER* (2006), available at <http://www.thecornerhouse.org.uk/sites/thecornerhouse.org.uk/files/carbonDDlow.pdf>; FRIENDS OF THE EARTH, *SUBPRIME CARBON? RE-THINKING THE WORLD'S LARGEST NEW DERIVATIVES MARKET* (2009), available at <http://www.foe.org/pdf/SubprimeCarbon Report.pdf>. An unusually ill-informed rant

firms do likewise, even though there is no federal compliance mechanism in existence for carbon dioxide emissions. In addition, governments and NGOs have purchased carbon credits to support early market development or to fund important conservation projects.

The World Bank and others have developed a program of “REDD-Readiness” to assist nations in managing the barriers to effective implementation of REDD projects.²¹ The list of activities involved in achieving REDD-readiness is extensive (Table 1). Individual nations are supporting tropical forest conservation directly, as with Norway’s major contributions to Amazon projects.²² Further, firms active in the carbon markets have developed their business to support financing, developing, monitoring, and implementing REDD projects.²³ They have become major advocates for REDD programs, and have conducted “pre-compliance” projects.²⁴ Undoubtedly, all these activities have developed awareness and capacity in governments of tropical nations of the challenges and opportunities of REDD.

B. *Setting: The Tropical Forest*

This analysis focuses on 26 tropical nations containing 10 million or more hectares of forest according to the Food and Agriculture Organization (Fig. 1). A focus on this sample will enable a data-intensive examination of the issues without overloading the discussion with detail. These 26 nations account for an estimated 36% of the earth’s forest cover (1.4 million hectares), and

in a major magazine indicates how popular criticism is of carbon trading in general and offsets in particular. Mark Schapiro, *Conning the Climate: Inside the Carbon Trading Shell Game*, HARPER’S, Feb. 2010, at 31.

21. The World Bank reports annually on its program. For an overview and country level details, see WORLD BANK, FOREST SCRAPBOOK: PRACTICAL GUIDANCE FOR SUSTAINING FORESTS IN DEVELOPMENT COOPERATION (2008). The Bank reports on its Forest Carbon Partnership in FOREST CARBON PARTNERSHIP FACILITY, HARVESTING KNOWLEDGE FROM REDD-PLUS: EARLY LESSONS FROM THE FCPF INITIATIVE AND BEYOND 28 (2010).

22. See Press Release, E.U. Council, EU Commission Endorses Poznan Declaration on Reducing Emissions from Deforestation (Dec. 12, 2008).

23. For lists of firms in the carbon market, and how the supply chain functions, see Valentin Bellassen et al., *Reducing Emissions From Deforestation and Degradation: What Contribution From Carbon Markets?*, at 19 (CLIMATE REPORT No. 14 Sept. 2008); KATHERINE HAMILTON ET AL., *supra* note 19, at 5-7.

24. For a broad review with many examples, see CARBON FINANCE: ENVIRONMENTAL MARKET SOLUTIONS TO CLIMATE CHANGE 1-336 (Bryan Garcia & Eric Roberts eds., 2010). See also table one in the article that is copied from Angelsen, *supra* note 10, at 44.

TABLE 1: REDD READINESS ACTIVITIES

Strategy Development;	Tax reform; treasury reform
Establish relevant infrastructure	Standards and guidelines;
Stakeholder consultations; Pilot testing;	Enforce planning and environmental requirements;
Land tenure reform;	Independent monitoring;
Establish baseline, monitoring systems, and inventory;	NGO capacity building;
Land use planning and zoning;	Effective judicial system;
Develop capacity for support services for implementation;	Institutional reform, clarification of roles and responsibilities;
Forest policy and legislation reform;	Capacity to process and manage payments to beneficiaries

the great majority of the tropical forest. For reader convenience, in most charts, France and the U.S. are included to provide comparison benchmarks.

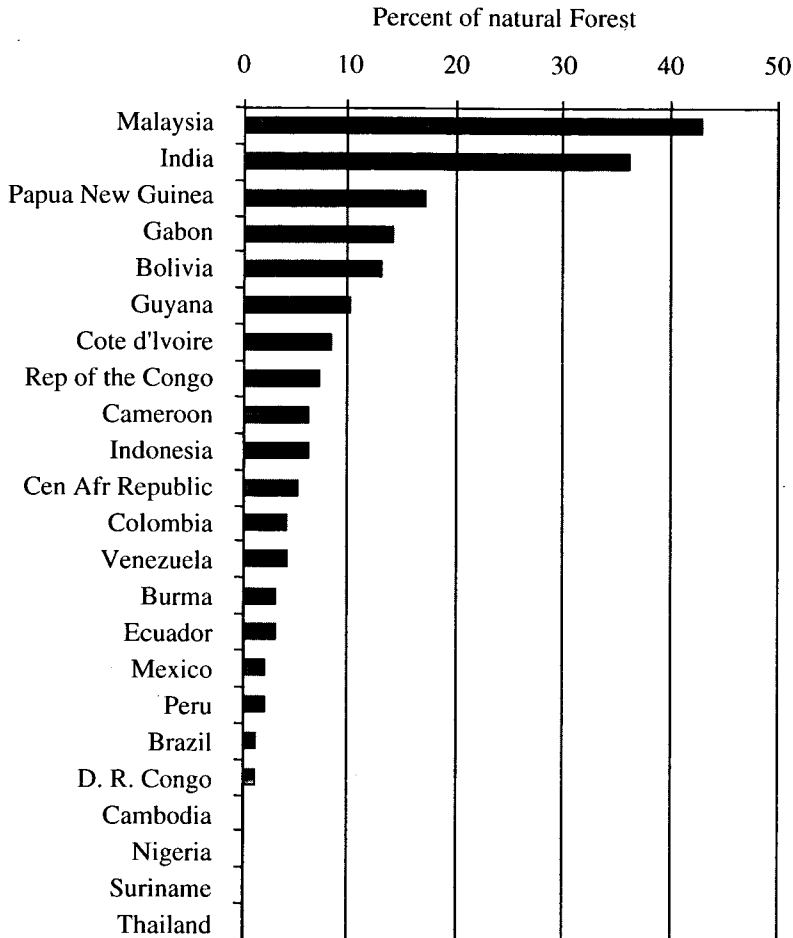
Tropical Forest loss is significant, amounting to some 10-20 million hectares lost each year.²⁵ In addition, degradation of forest by harvesting the few valuable stems per hectare is reducing the economic value of the forest, opening it up to conversion to farming, and accelerating carbon losses. For many of these nations, forest inventories and land use data are so poor that forest trends cannot be measured with any precision.²⁶

In most of these tropical nations, the bulk of the forest is claimed as public land, owned by the national governments. According to the International Tropical Timber Organization's 2005 Assessment, these nations have compiled an abysmal record of

25. The FAO's 2010 Assessment estimates that global deforestation, mostly in the tropics, was 13 million hectares from 2000-2010. The loss was relatively greater in undisturbed primary forests. FAO, *GLOBAL FOREST RESOURCES ASSESSMENT 3, 5* (2010). Most observers agree that the global economic crisis reduced demand on tropical forests after 2006. Experts estimate forest area change by a variety of methods, all of which have major weaknesses. As a result, no single point estimate can be considered authoritative. See appendices to full 2010 Assessment. For full discussion of trends and causes, see WORLD BANK, *POLICY RESEARCH REPORT: AT LOGGERHEADS? AGRICULTURAL EXPANSION, POVERTY REDUCTION, AND ENVIRONMENT IN THE TROPICAL FORESTS* (2006); Ruth DeFries et al., *Deforestation Driven by Urban Population Growth and Agricultural Trade in the Twenty-First Century*, 3 *NATURE GEOSCIENCE* 178 (2010). The magisterial history is MICHAEL WILLIAMS, *DEFORESTING THE EARTH: FROM PREHISTORY TO GLOBAL CRISIS* (2002).

26. For more detail, see Lloyd C. Irland, *Assessing Sustainability for Global Forests: a Proposed Pathway to Fill Critical Data Gaps*, 129 *EUR. J. FOREST RESEARCH* 777-786 (2009).

FIGURE 1: FOREST AREA (2005)



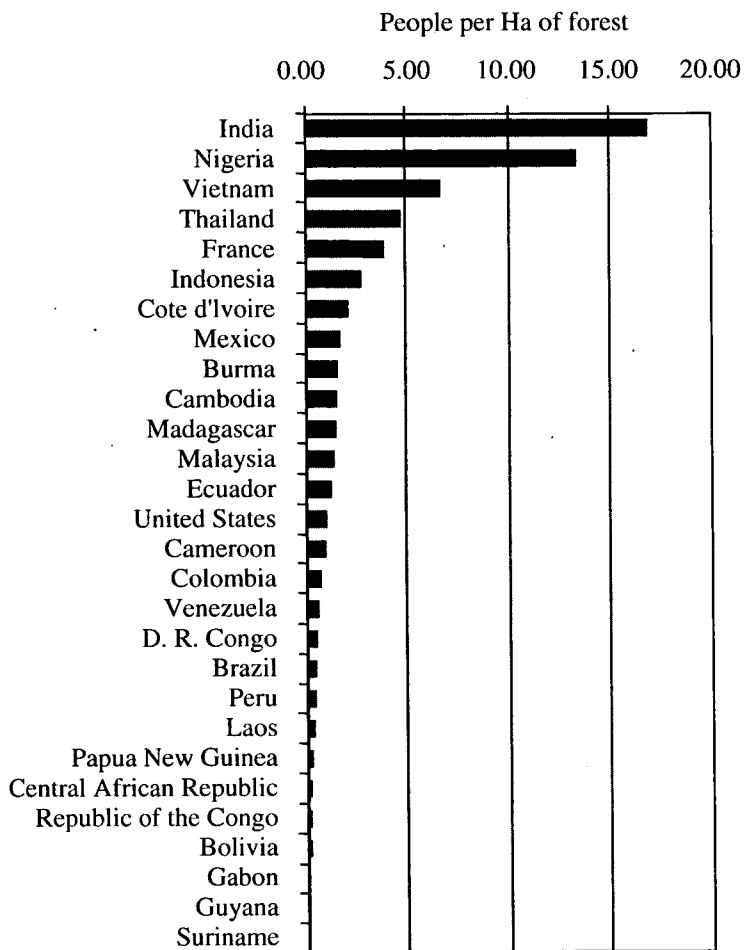
Note: These 26 nations include all tropical nations with estimated forest areas exceeding 10 million ha according to the Food and Agriculture Organization of the UN.

forest management (Fig. 2). Further, in most of these nations, illegal logging is rampant.²⁷

We now have the surprising proposal that a particular form of property right in these very forests — rights to the carbon content of the trees — be sold by these government claimants to private parties or foreign governments. The premise underlying this concept is that a market for this property right will fund pro-

27. See Lloyd C. Irland, *State Failure, Corruption, and Warfare: Challenges for Forest Policy*, 27 J. SUSTAINABLE FORESTRY 189, 191–93, 199–202, 207–10 (2008).

FIGURE 2: PERCENT OF NATURAL FOREST SUSTAINABLY
MANAGED, AS ESTIMATED BY INTERNATIONAL
TROPICAL TIMBER ORGANIZATION 2006



Note: Cambodia, Nigeria, Suriname, and Thailand were either zero or had no available data to support a judgment.

grams that will ensure preservation of the forests. I argue here that this is a bold hypothesis indeed.

1. Economics of Tropic Forest Management

As a general rule, managing natural tropical forest is not a business proposition. This applies not only to timber, the traditional resource considered, but especially to all the forest's nontimber values. There are several reasons:

1. Growth rates of the natural forest are low, often amounting to two to five cubic meters per hectare per year.²⁸ Intensively managed plantations can produce five to ten times as much. Further, in many cases, the marketable trees occur as a few stems per unit area, so that logging and roading costs are high.
2. Competing forms of land use, often estate crops for the international market, can pay high prices for land that forest management cannot match.
3. Major values of the tropical forest are in the form of “environmental services” for which a landowner, private or public, receives no revenue.
4. Owners or concession holders cannot protect their forests from encroachment by nearby residents, plunder by illegal loggers, or revocation of rights by a new government.
5. Remaining forests are often remote from road or rail access. High costs of transporting logs to markets depresses the value of standing timber.
6. A first cut, of the few valuable stems per acre, is frequently profitable for a logging concessionaire or landowner, but decades are required for valuable species to re-grow in commercial quantity. In an economy where market interest rates can be 10-20% per year, the present value of such deferred yields is nominal.²⁹
7. Scientific knowledge of methods for regenerating high value species in natural forests is weak almost everywhere. Where systems for tropical silviculture have been worked out, it is most often for regenerating monocultures of valu-

28. An immense specialist literature examines local cases, often from limited perspectives. A summary by Bawa and Seidler is apt: “Most researchers agree that it is the economic, social, and political aspects of NFM that present decisive obstacles. The social conditions that would permit the technical possibilities to be realized — such as stronger national forestry sectors, more realistic national and international pricing and accounting systems, and sharing of the costs of externalized forest services—show few signs of becoming widespread within the next few decades.” P.K. Bawa & R. Seidler, *Natural Forest Management and Conservation of Biodiversity in Tropical Forests*, 12 CONSERVATION BIOLOGY, 46, 52 (2008). See also W. F. Hyde, *Limitations of Sustainable Forest Management: An Economics Perspective*, in INSTITUTIONS, SUSTAINABILITY, AND NATURAL RESOURCES 193-210 (S. Kant & K. Berry eds., 2005) (analyzing the issue from an economic standpoint).

29. At a discount rate of 20%, not high for private investors in risky locations, a sum of one dollar payable in ten years has a present value of sixteen cents. At a discount rate of only 6%, a dollar payable in 40 years, a short time for growing trees in natural forests, is worth a dime today; a dollar payable in 80 years at six percent would have a present value of one cent.

able species, or managing mixtures with costly and intensive treatments.

These facts, plus economic and governance weaknesses noted below, explain why tropical forests are steadily disappearing. It remains to be seen whether augmenting the revenue stream of forest rights holders by making carbon rights marketable can fundamentally alter this grim situation. Why does this matter? It matters because these forests produce diverse, important, and unique environmental services, often termed "positive externalities" by economists.³⁰

2. Economic Challenges and Population Pressures

The nations studied here face severe economic challenges, including low income levels, low investment, poor infrastructure, and inadequate public services of all kinds.³¹ Poverty is extreme. In 11 of the 26 nations, more than 50% of the population earns \$2.00 a day or less. Five of the African nations (Republic of the Congo, Central African Republic, Madagascar, Democratic Republic of the Congo, and Nigeria) are among the poorest in the world, in all of them more than 74% of their populations earn less than \$2.00/day. Inflation, high financial market interest rates, and weak financial systems plague all forms of private business. In many of these nations, the forest is filled with communities and settlements. It is quite unlike parts of nineteenth-century North America where vast unpopulated areas could be set aside as parks or wilderness, with little impact on nearby communities. Instead, in the tropics, local communities depend on nearby forest and woodland for fuel, fodder, bushmeat, medicinals, and a host of specialized food plants and nonfood materials. In the semi-arid forest and savannah margins, livestock herds have increased to levels that are a serious ecological stress on trees and shrubs; managing livestock levels to return to ecosystem sustainability is extremely difficult.³²

In these 26 nations, population pressure on the forest, measured as people per hectare of forest, varies over a wide range.

30. See WORLD BANK, *supra* note 23, at 6; Rebelo, *supra* note 11. A useful summary is found in TEEB, THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY, CLIMATE ISSUES UPDATE 10 (2009).

31. For a readable overview of what "traps" countries in poverty see PAUL COLLIER, THE BOTTOM BILLION 19-75 (2007). See also JEFFREY SACHS, THE END OF POVERTY: ECONOMIC POSSIBILITIES FOR OUR TIME (2005).

32. HENNING STEINFELD ET AL., U.N. FOOD & AGRIC. ORG., LIVESTOCK'S LONG SHADOW: ENVIRONMENTAL ISSUES AND OPTIONS 185, 191, 251-254 (2006).

India, Nigeria and Vietnam all had more than 5 people per hectare of forest in 2008. Most of the other nations have low levels of population pressure at present (Fig. 3). But the 26 nations considered here are projected to increase in aggregate population from 2.4 billion in 2008 to 3.6 billion in 2050 – an increase of 1.2 billion people. This is equal to another China. This 53% increase is bound to severely stress all resources — whether fuel, timber, medicinals, fodder, or water. Rising population pressure cannot but escalate the existing tensions over who has rights to what resources — whether timber, carbon, medicinal plants or fodder.³³ Chronic hunger and malnutrition are widespread in some of these nations. According to the Global Hunger Index, eleven of these nations had Hunger Indexes exceeding 15; industrial nations are effectively at zero.³⁴

3. Governance Challenges

The nations in this sample almost all rate poorly by any of several ratings of governance (Fig. 4). Several would rank as “failed states.” A failed state is one where collapse of central government is essentially complete.³⁵ In our sample, only the Democratic Republic of the Congo is a recognized failed state.³⁶ A 2004 report by the United Kingdom Department for International Development identified 46 “fragile” states.³⁷ Taken together, 35 fragile and prominently forested states lost an estimated 21% of their forest area in just the 15 years between 1990 and 2005.³⁸ Ten of the nations in our present sample appear on this fragile states list: Myanmar, Cambodia, Cameroon, Central African Republic, Cote d’Ivoire, Democratic Republic of the Congo, Guyana, Indonesia, Lao PDR, and Papua New Guinea.³⁹ Together their forest area in 2005 exceeded the entire forest area of the U.S. .⁴⁰ Insecurity of land rights and weak gov-

33. For background on the challenges, see H. Charles J. Godfray et al., *Food Security: The Challenge of Feeding 9 Billion People*, 327 SCI. 812 (2010).

34. Klaus von Grebmer et al., Int’l Food Policy Research Inst., 2009 Global Hunger Index: The Challenge of Hunger: Focus on Financial Crisis and Gender Inequality 11-15 (2009).

35. Chester A. Crocker, *Engaging Failing States*, 82 FOREIGN AFF. 32, (2003).

36. Irland, *supra* note 27, at 194.

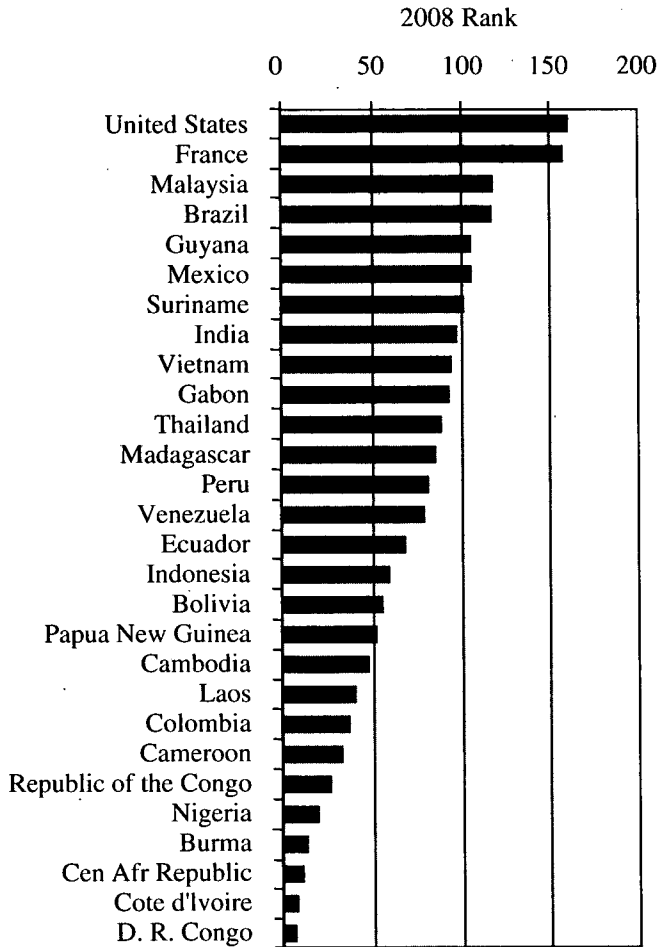
37. U.K. DEPT. INT’L DEV., WHY WE NEED TO WORK MORE EFFECTIVELY IN FRAGILE STATES, at 6 n.7 (2005). See Irland, *supra* note 27, at 194.

38. Irland, *supra* note 27, at 194.

39. U.K. DEPT. INT’L DEV., *supra* note 37, at 6 n.7.

40. See Irland, *supra* note 27, at 196 tbl.1.

FIGURE 3: POPULATION PRESSURES ON FOREST



Source: Population Reference Bureau, Population Data Sheet (2009).

ernance⁴¹ are barriers to sustainable management. They are also serious barriers to any measures to restrain forest loss.⁴²

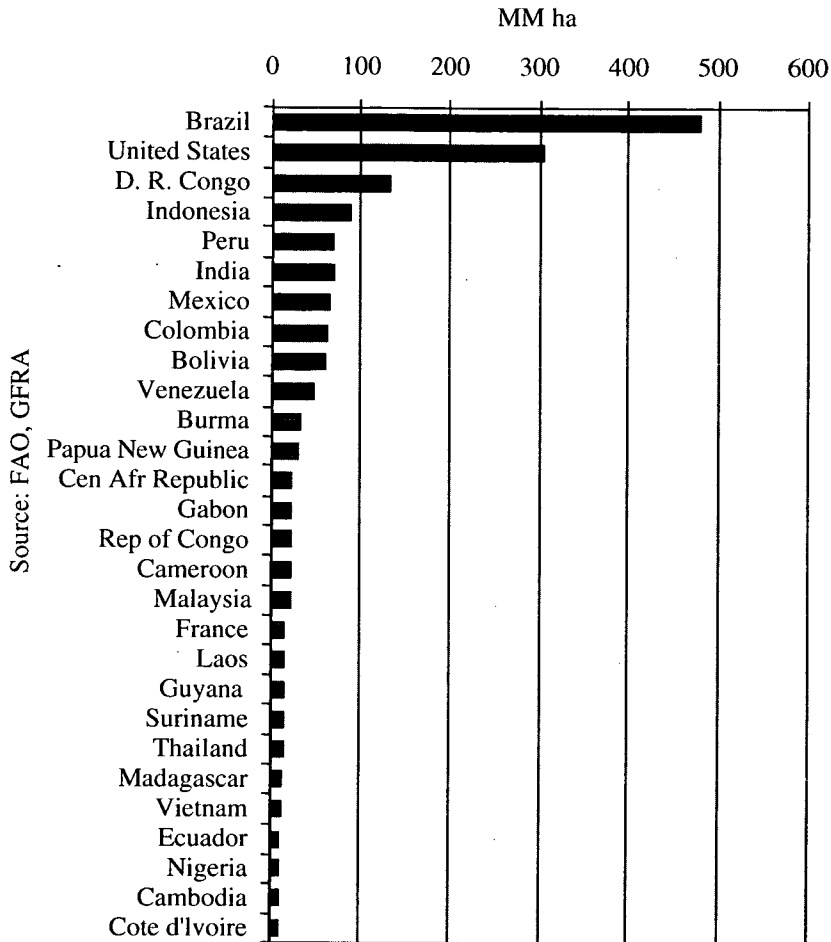
Rights to forest ownership and use are not clearly accepted and documented in many of these regions.⁴³ When conquering

41. An extreme example of institutional weakness: in some of these nations, many teachers and health workers routinely cash paychecks but do not think it important to appear at the workplace. See Nazmul Chaudury et al., *Missing in Action: Teacher and Health Worker Absence in Developing Countries*, 20 J. ECON. PERSP. 91, 91-92 (2006).

42. EVY VON PFEIL & CORNELIA SEPP, GER. TECH. COOPERATION, FOREST GOVERNANCE IN A RAPIDLY CHANGING WORLD 9-14 (2008).

43. See LAWRENCE C. CHRISTY ET AL., WORLD BANK, LAW JUSTICE, & DEVELOPMENT SER. NO. 40003, FOREST LAW AND SUSTAINABLE DEVELOPMENT: ADDRESS-

FIGURE 4: FAILED STATES INDEX RANK, 2008



Source: The Fund for Peace.

empires acquired these nations as colonies, they often simply declared the remaining forests — often inaccessible to modern loggers, roadbuilders, miners, or farmers — to be the property of the state. They ignored the indigenous peoples already living there who used the forest in myriad ways. Following the depar-

ING CONTEMPORARY CHALLENGES THROUGH LEGAL REFORM 29-31 (2007); THE FORESTS DIALOG, BEYOND REDD: THE ROLE OF FORESTS IN CLIMATE CHANGE 3 (2008); U.N. FOOD & AGRIC. ORG., FAO FORESTRY PAPER, MANAGING FORESTS AS COMMON PROPERTY 136 (1998); ANDY WHITE & ALEJANDRA MARTIN, FOREST TRENDS, STRATEGIES FOR STRENGTHENING COMMUNITY PROPERTY RIGHTS OVER FORESTS: LESSONS AND OPPORTUNITIES FOR PRACTITIONERS 4 (2002); See generally Phillip M. Fearnside, *The Roles and Movements of Actors in the Deforestation of Brazilian Amazonia*, 13 *ECOLOGY & SOC'Y* 23 (2008).

ture of colonial overlords, little changed; in some respects the situation for forest dwellers got worse. Social divisions between the urbanized elites running the new republics, and the low income and socially disadvantaged populations of jungles and mountains, meant that the rural poor and the indigenous forest inhabitants gained little or no political leverage from decolonization. Their claims to property and use rights in the forests continued to go unheard.⁴⁴ Due to their remoteness, the sway of central government in many forest regions is limited to nonexistent. Even if rights were acknowledged on paper, there is no machinery to enforce or protect them. Indeed, governments in many countries cannot protect even public lands, much less adjudicate private rights. The production and export of illicit narcotics are major industries in at least six of the nations in our sample.⁴⁵ Drug lords maintain control over large territories and may not welcome interventions aimed at enforcing the rule of law in the name of saving biodiversity and the global climate.

Weak government is closely related to severe corruption. Fully 49% of the world's forest lies in nations rating a three or below (which indicates rampant corruption) on a scale of one to ten on a widely used index of corruption (Fig. 5). Corruption is deeply rooted in history.⁴⁶ There has been a most welcome improvement in willingness to discuss this issue, most importantly in the aid community, which for a generation swept it under the carpet.⁴⁷ But progress in dealing with corruption moves forward at a glacial pace.⁴⁸ Officers of Interpol have been quoted as say-

44. See generally JANE CARTER ET AL., *FORESTS, LANDSCAPES AND GOVERNANCE: MULTIPLE ACTORS, MULTIPLE ROLES* (2009); SURVEY OF INDIGENOUS LAND TENURE (Marcus Cholchester ed., 2001); TOM GRIFFITHS, *SEEING "REDD"? FORESTS, CLIMATE CHANGE MITIGATION AND THE RIGHTS OF INDIGENOUS PEOPLES AND LOCAL COMMUNITIES* (2009); JAMES C. SCOTT, *THE ART OF NOT BEING GOVERNED: AN ANARCHIST HISTORY OF SOUTHEAST ASIA* (2009).

45. U.S. DEPT. OF STATE, *INTERNATIONAL NARCOTICS CONTROL STRATEGY REPORT 2009* (2009).

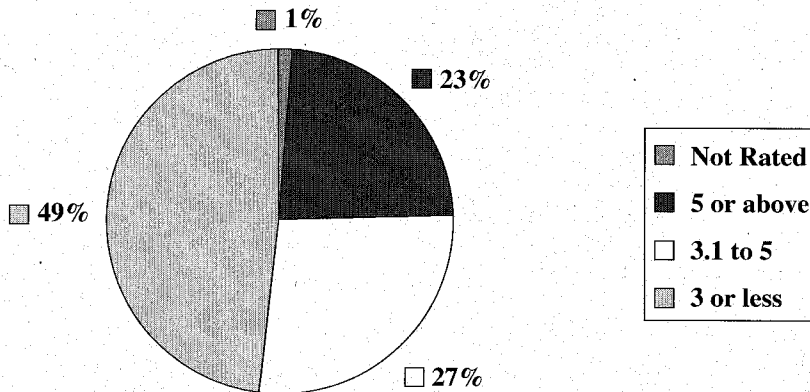
46. On Africa generally, see JOHN READER, *AFRICA: BIOGRAPHY OF THE CONTINENT* (1997). For an especially vivid illustration, see MICHELA WRONG, *IN THE FOOTSTEPS OF MR. KURTZ: LIVING ON THE BRINK OF DISASTER IN MOBUTU'S CONGO* (2002). Similar excesses persist elsewhere. On South America, see JOHN ELLIOT, *EMPIRES OF THE ATLANTIC WORLD: BRITAIN AND SPAIN IN AMERICA, 1492-1830* (2006). For multiple index entries on the subject, see RAMACHANDRA GUHA, *INDIA AFTER GHANDI* (2007).

47. The "conspiracy of silence" is discussed in Irland, *supra* note 27, at 207-08.

48. See CHRISTOPHER BARR ET AL., *FINANCIAL GOVERNANCE AND INDONESIA'S REFORESTATION FUND DURING THE SOEHARTO AND POST-SOEHARTO PERIODS, 1989-2009* (2009); HUMAN RIGHTS WATCH, *WILD MONEY: THE HUMAN RIGHTS CONSEQUENCES OF ILLEGAL LOGGING AND CORRUPTION IN INDONESIA'S FOR-*

ing that REDD programs will likely see organized crime groups taking their cut.⁴⁹ The chance of creating a marketable property right in forest carbon in such nations seems small.

FIGURE 5. WORLD FOREST AREA 2005



A major challenge to the long-term management of tropical forests is that, recognizing the wide spread failure of the central governments to manage the forests, various forms of decentralization of forest management have taken place.⁵⁰ The hope is that this will improve accountability and enable local people to be enlisted in management with a stronger interest in protecting the forest and local use rights. Thus far, the overall evidence does not support this hope. According to Larson and Ribot:

[D]emocratic decentralization, even where legislated, is rarely implemented well . . . there is no established correlation between policies that have been implemented in the name of decentralization (or devolution) and better forest management or improved livelihoods.⁵¹

ESTRY SECTOR (2009) (discussing the anatomy of corruption in the forestry sector with an emphasis on bureaucracy, law enforcement and judiciary). See also William Easterly, *Can the West Save Africa?*, 47 J. ECON. LITERATURE 373, 426-28 (2009).

49. John Vidal, *UN's Forest Protection Scheme at Risk From Organised Crime, Experts Warn*, GUARDIAN (U.K.), Oct. 5, 2009, <http://www.guardian.co.uk/environment/2009/oct/05/un-forest-protection>.

50. WORLD BANK, *supra* note 25, at 159-163; see also Catherine Tucker, *Learning on Governance in Forest Ecosystems: Learning from Recent Research*, 4 INT'L J. COMMONS, 687, 692-94 (2009); WORLD BANK, *supra* note 25.

51. Anne M. Larson and Jesse C. Ribot, *Lessons from Forestry Decentralization, in REALISING REDD+: NATIONAL STRATEGY AND POLICY OPTIONS* 175, 176-77 (Arlid Angelsen ed. 2009). See also FORESTS FOR PEOPLE: COMMUNITY RIGHTS AND FOREST TENURE REFORM (Anne M. Larson et al. eds., 2010).

Locally based management may yet, in some instances, turn out to be more attentive to forest conservation than past central control. But it is not a substitute for effective and stable central government in creating legal and macroeconomic environments supportive of long-term forest management, whether for timber, wildlife, recreation, environmental services, or carbon storage. Further, local management authority creates yet another layer of complexity for administrators of REDD projects. Anecdotally, it is far from clear that local administration makes it easier to control corruption.⁵²

C. *Delivering a Marketable Carbon Credit: Compliance Market*

1. What Is a REDD Project?

A REDD carbon credit can only originate in a project that is developed under UNFCCC and national policies and rules adopted for REDD, and for which the carbon credits are rigorously verified by third party auditors. At this writing, of course, these policies and rules do not as yet officially exist. In the wake of the Cancun Conference in 2010, further technical work on these issues continues. A marketable carbon credit for a compliance buyer must meet many strict criteria. It is not necessary to elaborate these here; they can be reviewed in many manuals and technical articles.⁵³ At present, forest based carbon credits are being developed under the so-called CDM (Clean Development Mechanism) program, but only a tiny number of projects have

52. See, e.g., UNDP, *STAYING ON TRACK: TACKLING CORRUPTION RISKS IN CLIMATE CHANGE* 1-17 (2010).

53. See TIMOTHY PEARSON ET AL., WINROCK INT'L, *GUIDEBOOK FOR THE FORMULATION OF AFFORESTATION / REFORESTATION AND BIOENERGY PROJECTS IN THE REGULATORY CARBON MARKET* (2009). For current and detailed discussion of project level issues, see ONF INT'L, *REDD + AT PROJECT SCALE: EVALUATION AND DEVELOPMENT GUIDE* (2010), available at <http://www.onfinternational.org/en/publications/313-qguide-redd-a-lechelle-projetq-guide-devaluation-et-de-developpement.html>. This work also includes five short case studies. Useful case examples are also offered in: THE NATURE CONSERVANCY, CONSERVATION INT'L & WILDLIFE CONSERVATION SOC'Y, *REDUCING EMISSIONS FROM DEFORESTATION AND DEGRADATION (REDD): A CASEBOOK OF ON-THE-GROUND EXPERIENCE* 66 (2010), available at http://www.thredddesk.org/resources/reports/reducing_emissions_from_deforestation_and_degradation_redd_a_casebook_of_on_the_gr; UNEP RISO CENTRE, *PATHWAYS FOR IMPLEMENTING REDD+: EXPERIENCES FROM CARBON MARKETS AND COMMUNITIES* 155 (Zhu et al. eds., 2010), available at <http://www.uneptie.org/energy/pdf/pathwaysimplementingreddplus.pdf>.

been certified for compliance use.⁵⁴ CDM projects in forestry have included a range of different versions of forest plantations and improved management projects. Project managers, developers, and their consultants must prepare complex analyses and documentation setting forth how the project will function and demonstrating credible evidence that the project will retain the estimated amount of carbon. The CDM program continues to be controversial, as some projects have been shown to be shaky at best.⁵⁵ But the procedures and issues developed for the CDM will likely be relied on in formulating rules for REDD projects.

A REDD project seeks to maintain carbon stocks in existing forest, instead of creating additional carbon stocks in new forests.⁵⁶ A REDD project, then, must address a number of actual or potential threats to the forest. Where existing uses are to cease, it must supply alternatives for the local people. Settlement of use rights, determination of local community roles, suppression of illegal logging, establishing forest guards and monitoring programs to safeguard the forest and enforce rules, and many other tasks will require sound administrative capacity, clear legal frameworks, funding, and local support. Entities at different levels of the carbon credit supply chain will be involved. Further, several levels of government are necessarily involved, from the international entities devising REDD policies, to national authorities and agencies, to provincial and local governments. Allocating authority and funding among these actors will be challenging, as will ensuring accountability. The costs of carrying out all of these tasks will be large.

Thus, not only are the tasks complex, but the number of actors is very large, and not all of them share the same interests. REDD projects, like other forest projects, are likely to require very large upfront costs. They therefore require start-up funding

54. Carmenza Robledo & Hwang Ok Ma, *Why There Are So Few Forestry Projects under the CDM*, FOREST CARBON PORTAL (July 1, 2008), <http://www.forestcarbonportal.com/content/why-there-are-so-few-forestry-projects-under-clean-development-mechanism>.

55. A thorough discussion is found in Romulo Sampaio, *Seeing the Forest for the Treaties - Evolving Debates on CDM Forest and Forestry Project Activities 10 Years After the Kyoto Protocol*, 31 FORDHAM INT'L L. J. 634, 654-57 (2008).

56. T. E. JOHNS, E. JOHNSON & N. GREENGLASS, OVERVIEW OF READINESS FOR REDD: COMPILATION OF READINESS ACTIVITIES 11 (2009) (offering a catalog of REDD projects globally; this provides a good indication of the many different kinds of project activities).

from grants or by advance sale of prospective carbon credits.⁵⁷ Operating costs for such a project over its life will be significant, as boundaries will have to be protected, encroachments addressed, periodic verification reviews funded, and annual overhead costs funded. In many regions, conflicts and protection costs are likely to increase over the decades. Yet, the carbon credits can only be sold once and hence only a certain amount of revenue is available. The problem could be the most serious when the entire future flow of carbon credits are sold in one transaction at the outset. How will operating costs for the ninth decade be funded?

This proposed type of transaction proposes to turn the carbon content of specific areas of tropical forest into tradable financial instruments that can be used to offset emissions anywhere in the world where emitters are subject to emissions limits and are able to employ offsets. Thus would a property right in a tropical forest essentially enter into international trade, even while the trees remain standing undisturbed!

A carbon credit transaction is a business agreement between a seller and a buyer. Not only that, it is plainly one of the most complex business instruments ever devised, as the seller must commit to a wide range of costly activities whose outcomes are subject to uncertainty. A reliable property rights regime, with an honest court system to enforce contracts, is essential. Unfortunately, few of the tropical forest nations in our sample are able to deliver this. In the World Bank's governance rankings, about 200 countries are ranked by perceptions of the rule of law. Only three of the nations in our sample (Malaysia, India, Thailand) fall in the top half, though Brazil (46) comes close (Table 2); ten of them, with large and important forests, are perceived to rate below North Korea on the rule of law by respondents in the World Bank's surveys.

57. CTR. FOR INT'L FORESTRY RESEARCH, INFO BRIEF NO. 17, FINANCING REDD: LINKING COUNTRY NEEDS AND FINANCING SOURCES 2-4 (2008).

TABLE 2: WORLD BANK RULE OF LAW RATINGS

Country	2009 Percent Rank
United States	92
France	90
Malaysia	65
India	56
Thailand	54
Brazil	46
Suriname	44
Vietnam	42
Madagascar	40
Colombia	38
Gabon	32
Mexico	30
Indonesia	29
Guyana	28
Peru	26
Laos	20
Papua New Guinea	18
Cameroon	17
North Korea	14
Cambodia	13
Bolivia	12
Nigeria	11
Republic of the Congo	11
Ecuador	9
Burma	5
Central African Republic	5
Cote d'Ivoire	4
Venezuela	3
D. R. Congo	2

2. Carbon Credit as Real Estate Transaction: Who Owns the Carbon?

A carbon credit transaction based on a tropical forest represents a sale of an ownership right in the forest.⁵⁸ Under legal

58. See Michelle Passerow, *The Nature of the Right or Interest Created by a Market for Forest Carbon*, 3 CARBON & CLIMATE L. REV. 248, 250–53 (2008) for a short discussion. Samantha Hepburn, *Carbon Rights as New Property: The Benefits of*

systems similar to those of the U.S., standing timber is real property. In other legal systems, this may not be so. In the U.S., then, a carbon credit sale is a real estate transaction. The problem is that such transactions are extremely complex. A seller of carbon credits must guarantee performance on a mind-numbing list of issues, in each and every year, with results subject to audit along the way. Scientists and activists do not even agree on how to define many of the key issues. There is a growing list of "carbon standards."⁵⁹ All are complicated and costly to implement. A sale of a forest carbon credit can be thought of as a sale of cutting rights to the standing timber, with the forest measured as total carbon in the biomass rather than just merchantable logs. In traditional practice, timber is paid for when it is cut. For carbon sequestration, it is paid for when it is not cut.⁶⁰ All of these provisions and restrictions are designed to ensure, among other things, permanence, which is interpreted to mean duration of as long as 100 years.

The first requirement of any real estate transaction is to deliver marketable title. In many if not most nations, though, legal uncertainty exists concerning who actually owns the carbon in forests.⁶¹ Common sense would suggest that the owner of the trees (not always the owner of the land) would also own the contents of that tree, including the carbon. But common sense does not

Statutory Verification, 31 SYDNEY L. REV. 239, 255-271 (2009) supplies a thorough analysis, focusing on issues faced by Australian states as they seek to define carbon rights. She argues for adopting new statutory definition of a carbon right, instead of connecting it to traditional common law property rights concepts as several Australian states have done. In neighboring New Zealand, much has been done. See Peter Lough & Alastair D. Cameron, *Forestry in the New Zealand Emission Trading Scheme: Design and Prospects for Success*, 3 CARBON & CLIMATE L. REV. 281 (2008). Issues in the existing Kyoto system are addressed in Matthieu Wemaere et al., *Legal Ownership and Nature of Kyoto Units and EU Allowances*, in LEGAL ASPECTS OF CARBON TRADING: KYOTO, COPENHAGEN, AND BEYOND 35, 44-48 (David Freestone and Charlotte Streck eds., 2009).

59. JULIE L. BEANE ET AL., *FOREST CARBON OFFSETS: A SCORECARD FOR EVALUATING PROJECT QUALITY* (2008) offers a short summary and comparison. The area of carbon standards is dynamic and changes almost daily. A useful current listing is in KATHERINE HAMILTON ET AL., *STATE OF THE FOREST CARBON MARKETS 2009: TAKING ROOT AND BRANCHING OUT* 27-34 (2010).

60. Samantha Hepburn, *supra* note 58, at 255.

61. GRENVILLE BARNES & SHERI QUAIL, *PROPERTY RIGHTS TO CARBON IN THE CONTEXT OF CLIMATE CHANGE* 7-10 (2009), available at http://www.fig.net/pub/fig_wb_2009/papers/gov/gov_2_barnes.pdf; ESTEVE CORBERA, *WHO OWNS FOREST CARBON?* (2008); Butler, *supra* note 26. See also KATOOMBA GROUP, BAKER & MCKENZIE LEGAL ANALYSIS: SURUI REDD PROJECT, available at http://www.katoombagroup.org/events/baker_mckenzie.pdf.

always lead to the legally correct answer. In areas where clear property law, statutory or otherwise, defining ownership of carbon in forests is absent, REDD projects will not be undertaken, at least by private capital.

3. Who Owns the Land?

Basic land rights issues remain unresolved in most of the important tropical nations. The complexity of the various rights, the inter-community conflicts over uses, access, control, and rights of transfer, the vast areas and numbers of communities involved, and the population and land use pressures are daunting.⁶² Rights held or asserted by individuals, clans, communities, and larger groups interact in complex ways.⁶³ Outright violence is encountered in some regions.⁶⁴ Illegal loggers in parts of Southeast Asia and Africa are paramilitary organizations of local warlords; armed guards in camo fatigues toting AK-47s accompany convoys of log trucks.⁶⁵

Can these deeply rooted issues be brought to a sufficient degree of clarity? Let the experts speak. John Reader argues:

[L]iteracy transformed the flexibility of customary practice into hard, immutable, prescriptive law. . . Common official stereotypes about African customary land law thus came to be used by colonial

62. From 1950 to 2000, population in the developing world increased by 3.2 billion people. WORLD POPULATION BEYOND SIX BILLION, POPULATION REFERENCE BUREAU 5 (1999), available at <http://www.prb.org/Source/ACFAC54.pdf>. There has been little discussion of whether traditional rights and management approaches that worked in 1900 or 1950 are serviceable under unprecedented population pressures for which they were never historically adapted.

63. See CTR. FOR INT'L FORESTRY RESEARCH, INFO BRIEF NO. 22, RECOGNISING COMMUNITY RIGHTS — THE POTENTIAL AND CHALLENGES OF FOREST TENURE REFORM (Dec. 2009). An excellent legal review accounting for indigenous rights is DAVID TAKACS, CONSERVATION INT'L, FOREST CARBON LAW AND PROPERTY RIGHTS (2009). See also TAMARA GILES-VERNICK, CUTTING THE VINES OF THE PAST: ENVIRONMENTAL HISTORIES OF THE CENTRAL AFRICAN RAIN FOREST (2002); NANCY L. PELUSO, RICH FORESTS, POOR PEOPLE: RESOURCE CONTROL AND RESISTANCE IN JAVA (1994). For Latin America, see ANNE M. LARSON ET AL., CTR. FOR INT'L FORESTRY RESEARCH, TENURE RIGHTS AND BEYOND, COMMUNITY ACCESS TO FOREST RESOURCES IN LATIN AMERICA 50 (2010).

64. For an analysis of the situation in the Amazon, see MARK LONDON & BRIAN KELLY, THE LAST FOREST: THE AMAZON IN THE AGE OF GLOBALIZATION (2007). More recent, and focused on REDD+, is PETER H. MAY & BRENT MILLIKAN, CTR. FOR INT'L FORESTRY RESEARCH, THE CONTEXT OF REDD+ IN BRAZIL, DRIVERS, AGENTS, AND INSTITUTIONS 1-65 (2010).

65. The role of military and paramilitary groups, in a situation of extraordinary ethnic conflict and governance weakness, is well documented in Burma by Global Witness. See GLOBAL WITNESS, *supra* note 8.

officials in assessing the legality of current decisions, and so came to be incorporated in “customary” systems of tenure.⁶⁶

On this view, Reader argues, much of what appears to be “customary” may not reflect the understandings of the people themselves.

Another scholar, John Unruh, describes the land tenure situation in Africa as a serious obstacle to developing carbon offsets:

[L]and tenure is much more than just a set of variables to be changed, and that instead it exists as a prohibitive obstacle to the implementation of afforestation and reforestation sequestration approaches. Five primary tenure problems are [(1) the disconnect between customary and statutory land rights, (2) legal pluralism, (3) tree planting as land claim, (4) expansion of treed areas in smallholder land use systems, and (5) the difficulty of using the ‘abandoned land’ category. The pervasiveness of these tenurial issues mean that the prospects for successfully implementing afforestation and reforestation projects in Africa are in reality quite weak. The current project approach to carbon storage in Africa needs to be significantly realigned with African reality in order for sequestration expectations to be practical.⁶⁷

A westerner would quickly conclude that the solution to all these problems is simply to adjudicate the titles, and produce a modern computerized land cadastre – just like we have in the U.S. . But Atwood cautions that:

The costs of land titling may be quite high, and its effects contrary to expectations. A number of cheaper alternatives to land titling may be more effective in guaranteeing the land rights of African farmers in situations of growing land tenure change and uncertainty.⁶⁸

4. Contracting Carbon for a Century

The most significant problems, from a contract drafting viewpoint, are the long-term project duration and the complex provisions required for performance on REDD carbon credits. Since

66. JOHN READER, *supra* note 46.

67. JON D. UNRUH, *Carbon Sequestration in Africa: The Land Tenure Problem*, 18 GLOBAL ENVTL. CHANGE 700, 700 (2008).

68. DAVID A. ATWOOD, *Land Registration in Africa: The Impact on Agricultural Production*, 18 WORLD DEV. 659, 659 (1990). See also BEYOND THE SACRED FOREST: COMPLICATING CONSERVATION IN SOUTHEAST ASIA (M. DOVE et al. eds., 2011); AMITY A. DOOLITTLE, *Native Land Tenure, Conservation, and Development in a Pseudo-democracy: Sabah, Malaysia*, 34 J. PEASANT STUDIES 474 (2007); MARY FINLEY-BROOK, *Indigenous Land Tenure Insecurity Fosters Illegal Logging in Nicaragua*, 9 INT'L FORESTRY REV. 850 (2007).

the carbon in the forest must be retained in the ecosystem essentially forever to be kept out of the atmosphere, permanence is critical. As to permanence, a plausible analogy in real estate would be the 99-year ground lease.⁶⁹ A long-term ground lease would seem straightforward to many policymakers when compared to a 100-year carbon offset sale. Yet, a quick Web scan turns up dozens of law firms offering services in drafting ground leases and conducting litigation over their provisions. Further, the number of separate actors who must cooperate over long periods to conserve a given tract of tropical forest is unavoidably large. How are they to be bound firmly to the task over ten decades as times and circumstances change? Many of the nations concerned have not existed that long.

The legal aspects of managing carbon rights transactions are unavoidably complex, even in nations with well-developed property law. A glance at the twenty-seven pages of single-spaced legal language in the recently released Climate Action Reserve's Restrictive Covenant and Project Implementation Agreement, which is essentially the carbon credit sales contract, will illustrate the point.⁷⁰ This agreement and its accompanying project protocol are regarded by many as a highly credible basis for carbon credits.⁷¹ The implementation agreement is based upon a 114 page single spaced Protocol containing detailed provisions for

69. Another valid analogy might be the permanent conservation easement, a form of transaction that has generated a good deal of legal comment as its use has expanded in the past decade. See, e.g., JEFF PIDOT, *REINVENTING CONSERVATION EASEMENTS: A CRITICAL EXAMINATION AND IDEAS FOR REFORM* (2005). For a contrast between an easement and a carbon right, see Hepburn, *supra* note 58, at 263-64. Some attorneys appear convinced that the traditional "rule against perpetuities" may have been unwisely set aside in these cases.

70. Climate Action Reserve, Project Implementation Agreement (Mar. 30, 2010) (unpublished agreement), available at <http://www.climateactionreserve.org/wp-content/uploads/2009/03/PIA-3-30-10v1.pdf>. A law journal, *Carbon and Climate Law Review*, now addresses carbon law. Comment on legal aspects of carbon projects is found in Martijn Wilder & Louisa Fitz-Gerald, *Carbon Contracting*, in *LEGAL ASPECTS OF CARBON TRADING: KYOTO, COPENHAGEN, AND BEYOND*, *supra* note 52, at 295. See also Michelle Passerow, *The Voluntary Carbon Market: Its Contributions and Potential Legal and Policy Issues*, in *Legal Aspects of Carbon Trading: Kyoto, Copenhagen, and Beyond*, *supra* note 58, at 517.

71. In March 2010, the California Air Resources Board stepped back from its earlier endorsement of the CAR forest standard, creating confusion for those who had certified projects under it. This is another illustration of how difficult it is to develop widespread stakeholder agreement on forest standards. See David Diaz, *California Moves Carbon Offset Goalposts*, *ECOSYSTEM MARKETPLACE*, (Mar. 3, 2010), www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=7472§ion=home.

measuring and verifying the tons of carbon dioxide being transacted. The Agreement itself includes definitions “a” through “i”, extensive provisions that would be found in any conservation easement, and detailed discussion of how project risk is to be managed through a “buffer pool” of credits retained by the seller to make good on any losses to fire, wind-throw, or other causes. Suppose you have drafted the perfect legal instrument for a REDD forest carbon credit sale. But the project is in a country with dangerously limited protection for private property.⁷² Could you advise a compliance buyer to enter into it?

The permanence issue is well understood in the professional discussion on REDD, though analysis has been focused more on weather, biological, or economic risks to the forest. Many proposals for addressing risk exist, ranging from periodic detailed audits of forest carbon stocks, requiring sellers to retain a portion of the credits generated by a project (buffer pools or holdbacks), or various kinds of insurance programs. Insurance programs would naturally be of limited use in offsetting barriers caused by political instability, civil war, inadequate governance, or evolving legal regimes, which often appear in force majeure clauses.

III.

LESSONS FROM COMMONS THEORY AND HISTORY

A. *Theory of the Commons and Its Management*

There is no need to recapitulate the well-developed theory of the commons here. Briefly, this is a body of theory that seeks to understand how resources with a common property aspect are used, managed, destroyed, or conserved.⁷³

1. Atmosphere as a Commons

The greenhouse gas concentration of the atmosphere has a number of particular traits. Most importantly, there exist no en-

72. The World Economic Forum's Global Competitiveness Index includes a property rights index. See WORLD ECON. FORUM, THE GLOBAL COMPETITIVENESS REPORT 2010-2011 (2010). On this index, France received a score of 16, the US scored a 40, Russia scored a 128, and four nations in our sample were scored lower than Russia. *Id.* at 159, 287, 341.

73. The standard expression is ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990). For recent discussion, see Arun Agrawal, *Forests, Governance, and Sustainability: Common Property Theory and its Contributions*, 1 INT'L J. COMMONS 111 (2007); Jouni Paavola, *Governing Atmospheric Sinks: The Architecture of Entitlements in the Global Commons*, 2 INT'L J. COMMONS 313 (2008).

forceable property rights in the atmosphere's use and condition, especially its concentrations of pollutants. Carbon dioxide plays a peculiar role. It is not literally a pollutant. A certain concentration of carbon dioxide is essential for photosynthesis and to provide a climate warm enough to sustain life. Yet, most scientists agree that excessive carbon dioxide concentrations will have far-reaching harmful effects.⁷⁴

2. The Tropical Forest as a Commons

The tropical forests contain at least three specific components that can be viewed as a Commons. First, there are reserves of biodiversity — including hosts of species yet to be identified by science.⁷⁵ Second, there are reserves of genetic resources that have potential for pharmaceutical uses that could be of incalculable value. Third, and our focus here, is the forest's carbon content, which if released into the atmosphere, would significantly contribute to global warming. In local areas, the tropical forests stand on deep reserves of peat accumulated over long periods of time. Removal of the forest, for whatever purpose, results in the decomposition of the peat and release of its carbon into the atmosphere.

A classic treatment of the management of common pool resources is Nobelist Elinor Ostrom's *Governing the Commons*.⁷⁶ Summarizing results of a long line of research, she lists several variables that can be expected to influence outcomes:

1. Total number of decisionmakers
2. Number of participants minimally necessary to achieve collective benefit
3. The discount rate in use
4. Similarities of interests
5. Presence of participants with substantial leadership or other assets.

How might we assess the problem of managing the tropical forest commons against this list?

74. See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 31, 33, 48 (Rajendra K. Pachauri et al. eds., 2007); U.S. CLIMATE CHANGE SCI. PROGRAM, THE FIRST STATE OF THE CARBON CYCLE REPORT (SOCCR): THE NORTH AMERICAN CARBON BUDGET AND IMPLICATIONS FOR THE GLOBAL CARBON CYCLE (Anthony W. King et al. eds., Nov. 2007).

75. E.O. WILSON, THE DIVERSITY OF LIFE 134 (1992).

76. ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS, FOR COLLECTIVE ACTION (1990).

First, the total number of decisionmakers is large. This would include the major tropical forest nations, numbering perhaps 30 to 50 forested nations, plus perhaps a dozen industrial nations that actually purchase much of their wood exports, and some undetermined number of capped emitters or nations that might buy forest offsets based on REDD projects. This does not consider the millions of forest people and nearby communities depending on the resources of the forest.

Second, the number of participants minimally necessary to materially reduce CO₂ emissions from forest loss and degradation might be a large share of our sample of 26 tropical nations, each with more than 10 million hectares of forest.

Third, the discount rate is very high. From the standpoint of landowners or investors in the forest nations, this rate is high. Depending on inflation rates, it could reach 20% or more in extreme instances.⁷⁷ Further, local forest inhabitants are often at or near subsistence levels, suggesting that they have high discount rates for valuing future consumption. From the viewpoint of global society, the discount rate for valuing future benefits of biodiversity and protecting the global climate ought to be zero, according to at least some authors.⁷⁸ What matters, however, is the discount rate of the actors affecting tropical forests, not of global society. Hence, we can consider the discount rate to be high.

Fourth, similarities of interests are limited. Within the tropical forest, conflicting interests and needs are rife. To expect all local "stakeholders" to compose their differences and arrive at mutually agreed rights and plans, which can be expected to endure for any length of time, seems optimistic. Then there are conflicts between forest dwellers and residents elsewhere in their own countries, who look to those resources for energy supplies, foreign exchange, jobs, and other benefits. If interests were similar within these tropical nations, perhaps the outstanding property and use rights conflicts would already have been resolved.

Finally, substantial leadership or other assets are absent. It is difficult to see how a few tropical nations could exert sufficient leadership to enable a large proportion of our 26 nation sample to develop and implement an agreed upon policy. Even then,

77. See COLLIER, *supra* note 31.

78. See, e.g., of a vast literature, TALBOT PAGE, CONSERVATION AND ECONOMIC EFFICIENCY: AN APPROACH TO MATERIALS POLICY (1977).

due to governance weaknesses, the means to carry out such a policy are almost entirely absent in most of them.

What the system does possess, however, is the potential to bring to bear carbon revenues to fund the costs of REDD projects to protect the forests. But there are objections. As an innovative form of property right, a carbon credit arising from a forest is threatening to many people. Fears of dire consequences have been raised, some of which may seem overdramatized, to say the least. But this is what happens when claims to property rights are threatened, especially in an atmosphere of historically well-justified mistrust.

Most of past experience in managing common property resources has dealt with specific, tangible products or services. Resource users or their agents must be able to monitor whether other users of the Commons are following the rules. In the classic case of a commonly held pasture, cattle or sheep can be branded, and anyone can count the number of animals on the pasture at a given time and compare to the prescribed limit. Maintaining extensive watersheds covered with tropical forest is another matter. There may be numerous settlements close enough to use the occasional log or shrub, and the cumulative effect can be significant. Illegal loggers can be very resourceful in cutting valuable trees by night, at times even sawing logs into planks on site, and spiriting the products away.

Successful REDD projects are likely to entail a good deal more; however, than merely fencing off a forest and keeping goats and people out. REDD projects are not likely to succeed unless use rights of indigenous and nearby populations can be settled or at least managed. To bring this about is likely to take years, if not decades, in the best of situations, so the timeline for implementing REDD is likely to cover several decades. Also, any lost opportunities for food, fuel, income and livelihoods will have to be replaced by active management nearby that can replace those opportunities. Lastly, the vexing issue of leakage must be addressed. Leakage is the concern that carbon stored in a protected forest might be offset by losses from nearby areas if harvesting simply shifts to those areas.

On paper at least, there will be some areas where local terrain and limited road access will allow low-cost ongoing supervision and monitoring to ensure performance under a REDD agreement. But in the general case, long-term policing and monitoring will have to extend over decades at substantial annual costs.

How those costs will be funded remains a major uncertainty. The current generic term of art encompassing all these tasks is Monitoring, Reporting, and Verification (MRV).⁷⁹

B. *Learning from Ancient Parchments: Medieval Europe*

This section introduces a brief, stylized sketch to illustrate some important lessons about managing common resources that are relevant to the present challenges. In Medieval Europe, land was the primary economic asset. It was the source of subsistence for its tillers, income for its owners, and thereby of support, mostly in kind, for its rulers. Over the centuries, a complex system of rights to forest products and services was created that bears many resemblances to indigenous forest rights in the present-day tropics. In this period, the so-called “commoners” were not using an open access resource, but in fact one where use rights were meticulously measured out and managed. The roots of western property law emerged over centuries in this social system.⁸⁰

Generally speaking, there existed three forms of property:

1. ROYAL DOMAIN – the property of the monarchy, which it used for revenue, for its hunting and leisure activities, and as an asset base to reward supporters. In many places, the crown also owned all mineral rights.
2. FEUDAL TENURES – held from the sovereign in return for loyalty, service, and occasional financial dues. These were the “fiefs” of the noble families. Over time, the obligations to the feudal overlord came to be more in the nature of formalities, but the struggle by the noble families to convert feudal tenures into true private property (“fee simple”) occupied centuries, and took place at differing rates across Europe.

79. Despite the enormous amount of debate on this subject at its meetings, the UNFCCC Website lists no documents giving a general overview. See, for an introduction, WINROCK INT’L, A GUIDE TO MONITORING FORESTRY AND AGROFORESTRY PROJECTS (2007). See generally GLOBAL WITNESS, TRICK OR TREAT? REDD, DEVELOPMENT, AND SUSTAINABLE FOREST MANAGEMENT (Sept. 2009); Oscar Cacho et al., *Carbon Monitoring Costs and Their Effect on Incentives to Sequester Carbon Through Forestry*, 9 MITIGATION & ADAPTATION STRATEGIES FOR GLOBAL CHANGE 273 (2004); Arlid Vatn & Arlid Angelsen, *Options for a National REDD+ Architecture*, in REALISING REDD+: NATIONAL STRATEGY AND POLICY OPTIONS, *supra* note 51, at 58, 61.

80. DOUGLASS C. NORTH & ROBERT P. THOMAS, THE RISE OF THE WESTERN WORLD: A NEW ECONOMIC HISTORY 19-24 (1973).

3. **INALIENABLE TRUST PROPERTY** – nominally the property of the society as a whole, but in the special care of the sovereign. In England, such lands included tidelands, as well as fish and wildlife (*ferae naturae*).

But merely holding feudal rights to these lands was useless without ways to manage, harvest, and protect them. Over the centuries an elaborate system of land rights emerged, based on local needs, agricultural practices, and customs. Rights were granted by the overlords to individuals or groups. These may have been time limited or permanent, and they may have been in consideration of annual payments in kind or in cash. They were not always clearly limited as to quantities. Feudal holdings, as well as individual farms, quickly came to be fragmented and often dispersed in random and inconvenient ways. Farms were not laid out in neat 160 acre squares as in the U.S. Midwest. Nor were the larger feudal estates of which those farms were a part.

These lands were used quite intensively. Not only this, but land use was quite dynamic in some regions.⁸¹ Indeed, as population grew after the end of the Viking Age (11th century), forests were extensively cleared. After the population losses of the Black Death, lands returned to shrubland and forest; many villages vanished from the face of the earth – some, it is said, permanently. Use rights were highly specialized. A single forest could be split into a host of separate rights. In principle and often in practice, each separate right could be held by a different forest user or group.⁸² No single legislative scheme set out all of these rights and obligations. In England, the rights built up over time; disputes were settled in civil courts except in the Royal Forests which had their own bodies of law and custom. Forest use rights under this system included the rights to:

- Hunt large game, such as red deer (often reserved to the overlord)
- Hunt small game, such as rabbits

81. M. Williams, *Dark Ages and Dark Areas: Global Deforestation in the Deep Past*, 26 *J. HIST. GEOGRAPHY* 28, 37–38 (2000).

82. See, e.g., Karl Appuhn, *Inventing Nature: Forests, Forestry, and State Power in Renaissance Venice*, 72 *J. MODERN HIST.* 861 (2000); Jean Birrell, *Common Rights in the Medieval Forest*, 117 *PAST AND PRESENT* 22 (1987); The Medieval English Landscape (L. Cantor ed., 1982); Richard Keyser, *The Transformation of Traditional Woodland Management: Commercial Sylviculture in Medieval Champagne*, 32 *FRENCH HIST. STUD.* 353 (2009); European Woods and Forests: Studies in Cultural History (C. Watkins ed., 1998); and Dolores Wilson, *Multi-use Management of the Medieval Anglo-Norman Forest*, 1 *J. OXFORD UNIV. HIST. SOC'Y* 1 (2004).

- Harvest sawlog sized trees
- Remove small branches for fuel or fodder
- Remove timber to build or repair one's own home
- Remove timber for fencing on one's own property
- Remove dead logs and sticks already on the forest floor
- Graze hogs or other livestock (separate rights for different types of livestock often existed)
- Remove needles from the forest floor for livestock bedding (in conifer forests)
- Remove marl as a soil amendment for tilled lands
- Remove peat from bogs for fuel.

An array of officials administered all these rights and duties. The first "foresters" were less timber managers than they were boundary watchers, forest guards, and gamekeepers. The landowners' bailiffs and warders took care to supervise all of these forest users, enforce the landholder's rights, as well as to adjudicate disputes among the holders of these numerous use rights. Some of the enforcers were elected by the local communities. Archives of the noble families, forest courts, manors, and monasteries are filled with records of the grants of rights as well as the conflicts over them. Amidst war and tumult, records could be lost, and unscrupulous lords or tenants were not above destroying inconvenient documents or even forging new ones.

Over time, these ancient use rights evolved into modern private and public land tenures, along with leaseholds and documented rights to various forest uses. Even today in parts of Europe, ancient rights to graze cattle in forests persist. These systems of tenure and use rights were possible because they emerged over long spans of time, from the day to day experience of the rights holders and land users. The rights were negotiated among the parties and enshrined in private agreements, documented by charters or deeds held in private, and sometimes public, archives. The evolution of such practices into the modern public land cadastre with centralized property records took many generations, but detailed local land cadastres did exist many centuries ago.

These arrangements did not produce enlightened land management by the standards of a 21st century ecologist. Nor did they always accord with present notions of social justice. But they did at least allow a measure of predictability as to rights and distributions of the multiple products and values of forests. The

fact they persisted for long periods indicates that they met some basic test of serviceability.⁸³ Managers under the medieval systems of forest rights, however, worked with a number of advantages:

- Population growth was slow, and at times of crisis, even negative
- Consumption levels of wood products, except for fuel, were low
- Except near navigable water or canals, opportunities to ship products any great distance were limited. As a result, production primarily served local needs. Consumption, indeed, was often by the harvesters themselves
- While dynasties died out or were overthrown, or even came under the rule of entirely different cultures (e.g., Danes in England; Germans moving east through conquest, as well as cultural and commercial penetration; the Reconquista in Spain; the Turks in Southern Europe), local customs and property relations often survived such upheavals.

These forest rights systems share some similarities with indigenous forest use rights in some tropical forests. They result in numerous situations where many persons exercise rights over different resources of the same acre of forest: its wild game, its grass and forage, its nuts and fruits, and various categories of its timber products. The rights were not all “private” rights, but were held in a variety of ways, by individuals, lords, institutions, and communities. Essentially, they represented means of managing a forest through property rights rather than as an open-access commons.

But note the key points for the Medieval experience:

- Stability existed over time
- Rights were documented, at least in principle and often in practice
- Institutions for monitoring and adjudicating rights existed, though in practice the abbey, lord, or knight could deploy those institutions more to their advantage than could the *villein*
- The rights attached to tangible things – to animals, to identifiable parts of trees or shrubs

83. See Jules N. Pretty, *Sustainable Agriculture in the Middle Ages: The English Manor*, 38 *AGRIC. HIST. REV.* 1, 3 (1990).

- In most periods, living standards were low for virtually the entire population; demand for wood products rose slowly.

In many kingdoms and times, even the management of royal domain forests was plagued by incompetence, corruption, inattention to their management, and the effects of war, unrest, peasant revolts, and religious persecutions. Despite these seemingly endless disasters, today the national, state, and communal forests continue to exist, rooted firmly in the history of the feudal period. In France, for example, the present state forests are the former royal domainal forests, still noted as “domainal forest” on the maps.

In the case of tropical forests, the contrasts with the above conditions could hardly be more stark. Governance is anything but stable, rights are for the most part not documented, effective institutions for adjudication are generally absent, the rights relevant to carbon credits are incorporeal rather than tangible, and demands for all forest products and services are rising rapidly.

Most importantly, the rights to be created to enable the measurement and sale of forest carbon credits are incorporeal ones — they concern a part of the tree or shrub — its carbon. The carbon is the essence of the tree itself, it cannot be plucked, broken or sawn off, and carried elsewhere. Further, the purpose of creating this right is now to see that it is used by no one.

In countries with widespread fee simple property rights, land use rights are often highly fragmented, but this is at the option of the owner of the fee. For example, on a large timber property in the southern U.S., it would not be uncommon to find that the following kinds of rights are leased to or held by various other parties: rights to cut specific stands of timber, deer hunting rights, duck hunting rights, grazing rights, oil and gas leases, and utility line rights of way. A conservation easement might affect an environmentally sensitive portion of the property. These rights are typically fully documented, at least bilaterally if not in local deed registries. So, fragmented property rights in themselves are not the problem.

The problem is that systems of fragmented land rights are hard to change. As the medieval world modernized in response to changing economic, social, and political forces, trade patterns changed in response to new technologies and changing comparative advantage, especially in food and fiber crops. Attempts by the nobles to cancel traditional rights in the common fields and woods in order to profit from these new opportunities drew

fierce opposition. The opposition often led to passive resistance and violence. College students read about these strains in the history of the enclosure movement in England, the Highland Clearances in Scotland, and jacqueries and peasant revolts on the Continent. Similar experiences occurred elsewhere. These re-allocations of rights, enabling landlords to possess their properties in “fee simple” took many years to accomplish and left legacies of suffering and distrust for generations.

The experience of western nations in adapting medieval use rights to modernizing societies is not irrelevant to contemporary tropical nations — not least because state claims to ownership in fact derive from western legal conceptions. In many areas, customary use rights overlap for different uses on the same parcel, much as did use rights in medieval Europe. Implications of the medieval experience are several. First, adaptations can occur. The discouraging fact, though, is that they take a very long time, and can be accompanied by considerable conflict. There are winners and losers. To suppose that everyone can be held harmless in such a transition is unrealistic.

IV.

COPENHAGEN AND REDD

A. *What Happened – and Didn’t Happen – at Copenhagen*

At the December 2009 Copenhagen Climate negotiations, disappointments were many and accomplishments few.⁸⁴ The tea leaves are still being sifted by national negotiating teams, outside pundits and experts, nongovernmental organizations, the potentially regulated industries and interested financial institutions, and insiders as they seek to discern how to proceed to future climate change negotiations.⁸⁵

Forest advocates and concerned professionals, scientists, and public officials can take some solace in the high level of attention

84. Anyone reading James G. Speth would not have been surprised. See JAMES G. SPETH, *RED SKY AT MORNING: AMERICA AND THE CRISIS OF THE GLOBAL ENVIRONMENT* 77-117 (2004).

85. Those seeking a blow-by-blow discussion of the negotiations can find it at BENITO MULLER, *COPENHAGEN 2009: FAILURE OR FINAL WAKE-UP CALL FOR OUR LEADERS?* (2010). The events at the interim meetings and the major COPs are thoroughly discussed in IISD publications such as *EARTH NEGOTIATIONS BULLETIN, SUMMARY OF THE CANCUN CLIMATE CHANGE CONFERENCE 29 NOV TO DEC 20 2010*, available at <http://www.iisd.ca/climate/cop16/>; these also supply detailed reference to key documents.

received by forests during COP 15 and in the Accord issued at its end by the five signatories.⁸⁶ At Point 6, the Accord states:

We recognize the crucial role of reducing emissions from deforestation and forest degradation and the need to enhance removals of greenhouse gas emissions 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.

Further, Point 8 refers to providing “substantial finance to prevent deforestation (REDD-plus)” Also, Point 10 envisages a “Copenhagen Green Climate Fund” that will assemble and allocate funding to these and other climate-related activities. A later point provides that progress will be reviewed in 2015. It would be fair to say that specificity and accountability were lacking.

Most disappointing was that, despite high hopes for strong action on tropical forests, all that emerged from years of staff work and two weeks of negotiating was a fairly limp statement. Several nations pledged a total of \$3.5 billion annually for tropical forest programs. Some ongoing steps were timed for “rollout” at COP 15, including announcing intent for the U.S. EPA to regulate carbon dioxide, and a new World Bank programmatic REDD approach.⁸⁷

Walking the halls at COP 15, it occurred to some of us that the UN negotiations might actually be the “side event.” The “side events” — all of the seminars and activist demonstrations — might be the real event. Surely a tremendous amount of learning, experience, and progress was recounted at the side events, and widely shared with often overflow audiences. Everything

86. Copenhagen Accord, Dec. 18, 2009, available at <http://unfccc.int/resource/docs/2009/cop15/eng/107.pdf>. See K. Levin et al., *The Climate Regime as Global Forest Governance: Can Reduced Emissions From Deforestation and Forest Degradation (REDD) Initiatives Pass a ‘Dual Effectiveness’ Test?*, 10 INT’L FORESTRY REV. 538, 543–45 (2008). See also *Special Report: A Clear Cut Crisis*, WASH. MONTHLY, July/Aug. 2009, available at <http://www.washingtonmonthly.com/features/2009/0907.spc-sec.html>; Elizabeth Rosenthal, *Climate Talks Near Deal to Save Forests*, N.Y. TIMES, Dec. 15, 2009, <http://www.nytimes.com/2009/12/16/science/earth/16forest.html>.

87. Press Release, World Bank, World Bank Launches New Carbon Facility for GHG Emissions Reductions at COP 15 (Dec. 11, 2009), available at <http://climatechange.worldbank.org/climatechange/sites/default/files/CPFLaunchPressRelease12-11.pdf>; *Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/climatechange/endangerment.html> (last visited Mar. 30, 2011).

was seen, from abstruse discussions of satellite imaging for tracking forests, to extensive advocacy on behalf of indigenous communities, to encouraging signs that deforestation in the Amazon is decelerating. Major new research and analysis was unveiled on the occasion.⁸⁸ As the results achieved, the COP itself did turn out to be the side event. Nothing was done that could not have been done in a few conference calls by a small number of national leaders, or in informal session at some existing venue.

The reasons little was done on tropical forests at Copenhagen are three:

First, saving tropical forests is truly “the problem from Hell.” It is just not easy. It will not yield to simple solutions, as the facts introduced above show.

Second, it is not likely that 190 nations will agree on taking difficult decisions, when their stakes, circumstances, and interests diverge so widely.

Third, huge mistrust was evident on most issues, between different factions of nations, and between developing nations and indigenous people’s advocates and established UN and global entities such as the World Bank. Many representatives of indigenous peoples distrusted not only the COP process and its policy ideas, but their own national governments as well. It could be said that the mistrust was fully justified. Thus, a basic condition for a successful negotiation — a degree of mutual trust — was not met, and this was well understood before December 2009. So much for the official proceedings.

Progress that was reported in the side events, however, is significant and provides a base for further action on REDD-readiness. Notably, this progress was not accomplished by making deals with 190 nations in huge conference halls, but rather by determined groups of public officials, activists, scientists, NGOs, communities, and resource managers working in specific, local places. It was funded by a range of programs, from national sources, to foundations, to international aid agencies and charities. The limited results of the formal negotiations will not stop all of this. Perhaps leaders and pundits ought to more seriously consider the implications of the question: *were the formal negotiations really the side event?*

88. See generally Daniel Nepstad et al., *The End of Deforestation in the Brazilian Amazon*, 326 SCI. 1350 (2009); REALISING REDD+: NATIONAL STRATEGY AND POLICY OPTIONS, *supra* note 51.

B. *Policy Learning and REDD: Programmatic Puzzles*

Fortunately, REDD does not begin with a blank slate. Extensive policy experience over recent decades has accumulated, though not always well documented or analyzed for lessons learned.* A growing literature discusses primary and secondary causes of tropical deforestation. Considerable field research has been done on the challenges and opportunities of local management of forests in contrast to centralized management. The World Bank and others have embarked on programs of “REDD-Readiness” actions to assist nations in building administrative capacity and addressing land rights and other obstacles to successful REDD projects.⁸⁹

It is absolutely essential that accelerated policy evaluation research be conducted by truly disinterested parties on these major programmatic puzzles⁹⁰:

- How to decide when a nation is REDD-Ready, and who makes this decision?⁹¹
- How might national baselines, instead of project baselines actually work?⁹²

* But see K. Levin et al., *The Climate Regime as Global Forest Governance: Can Reduced Emissions From Deforestation and Forest Degradation (REDD) Initiatives Pass a ‘Dual Effectiveness’ Test?*, 10 INT’L FORESTRY REV. 538 (2008).

89. Sheila Wertz-Kanounnikof & Metta Kongphan-Apirak, *Emerging REDD+: A Preliminary Survey of Demonstration and Readiness Activities 1* (Ctr. for Int’l Forestry Research, Working Paper No. 46, 2009). Not surprisingly, initial moves have generated controversy. See KATE DOOLEY ET AL., *CUTTING CORNERS: WORLD BANK’S FOREST CARBON FUND FAILS FORESTS AND PEOPLES 6-9* (2008); see also RIGHTS & RESOURCES, *THE END OF THE HINTERLAND: FORESTS, CONFLICT, AND CLIMATE CHANGE 12* (2010).

90. See ANGELSEN ET AL., *supra* note 10, at 23-25 (offering extensive comment on these issues, especially those to be addressed at national levels); THE FORESTS DIALOG, *BEYOND REDD: THE ROLE OF FORESTS IN CLIMATE CHANGE* (2008) (stating list of topics needing urgent policy learning). A compendium on legal issues is INT’L UNION OF CONSERVATION OF NATURE, *LEGAL FRAMEWORKS FOR REDD: DESIGN AND IMPLEMENTATION AT THE NATIONAL LEVEL* (2009).

91. For a report on mapping the potential gains and risks for private carbon investors, concluding that risks are too high in many countries, see ADRIAN DEVENY, ET AL., *FOREST CARBON INDEX, THE GEOGRAPHY OF FORESTS IN CLIMATE SOLUTIONS* (2009) http://forestcarbonindex.org/RFF-Rpt-FCI_small.pdf. The market itself will decide where REDD offsets are ultimately purchased – but the best focusing of REDD-readiness efforts may not be obvious. See DOUG BOUCHER, UNION OF CONCERNED SCIENTISTS, *OUT OF THE WOODS: A REALISTIC ROLE FOR TROPICAL FORESTS IN CURBING GLOBAL WARMING 5-6* (2008).

92. See Lydia Olander et al., *Data and Methods to Estimate National Historical Deforestation Baselines* (Nicholas Inst., Duke Univ., Working Paper No. 07-05, 2007).

- Should policy regimes differ or high forest area nations with no deforestation, in contrast to low forest nations with high deforestation?
- How should priorities be set between carbon storage and biodiversity values?⁹³ What are the best methods to overcome or offset the effects of corruption?
- What are the financial requirements for successful REDD projects?
- What have been the most successful approaches for settling indigenous rights? How long can this be expected to take? What threshold requirements for such settlements ought to be adopted?⁹⁴
- Is local management in fact the best path in particular instances? How can the local managers be held accountable?
- What are the most effective means of improving local and national government capacity and reducing the incidence (or at least the ill effects) of corruption?⁹⁵
- How will nations, regions, local groups, and individuals be compensated, if at all, for opportunity costs of foregoing resource development and traditional uses in forests?⁹⁶ What lessons can be drawn from the brief history of efforts to develop payments for bioprospecting as a source of revenues to support forest preservation?
- What international body ought to administer carbon credit registries and what body ought to administer REDD-readiness funding programs?⁹⁷

93. See Alan Grainger et al., *Biodiversity and REDD at Copenhagen*, 190 CURRENT BIOLOGY 974 (2009) (arguing that by focusing on carbon only, REDD could make matters worse for tropical biodiversity). See generally Meine Van Noordwijk et al., *Reducing Emissions from Deforestation and Degradation (REDD) in Indonesia: Options and Challenges for Fair and Efficient Payment Distribution Mechanisms* (World Agroforestry Centre, Working Paper No. 81, 2008); RIGHTS-BASED APPROACHES: EXPLORING ISSUES AND OPPORTUNITIES FOR CONSERVATION (Jessica Campese et al. eds., 2009); Daniel Nepstad et al., *The End of Deforestation in the Brazilian Amazon*, 326 SCI. 1350 (2009).

94. See TAKACS, *supra* note 63.

95. See ANGELSEN ET AL., *supra* note 10. See also Luca Tacconi et al., *Anti-corruption Policies in the Forest Sector and REDD+*, in REALISING REDD+: NATIONAL STRATEGY AND POLICY OPTIONS, *supra* note 51, at 163-174.

96. See NATALIE OLSEN & JOSEPH BISHOP, INT'L UNION FOR CONSERVATION OF NATURE & NATURAL RES., *THE FINANCIAL COSTS OF REDD: EVIDENCE FROM BRAZIL AND INDONESIA* (2009) (referring to recent literature including the famous McKinsey Cost Curve).

97. This subject crosses over into the emerging area of supranational governance. See Daniel C. Esty, *Good Governance at the Supranational Scale: Globalizing Ad-*

- What forms of tropical forest conservation ought to be pursued outside of a REDD framework?

There has been considerable policy learning in the creation of specialized property rights, termed “emission allowances,” and the development of “constructed markets” in which those rights can be traded. The largest such market, the European Union’s Emissions Trading System, has generated considerable trading volume and practical experience in market design. Thus, in this list of puzzles there appear no technical questions of allowance market and offset project design. A huge literature has already marked out the major issues and options for that.

A growing commercial infrastructure is emerging, consisting of organizations capable of managing REDD projects, conducting the needed planning and verification, selling credits generated, and financing these activities. These are supported by an increasing number of law firms, newsletters, conferences for exchanging information and promoting the carbon business, and independent consultants. The retail customer, in many countries, can purchase a carbon credit to offset the carbon dioxide emissions from their automobile. A supply chain is being built that can bring a carbon offset from a tropical forest to a retail buyer or an eligible utility buyer anywhere in the world. A number of substantial firms are already engaged in this supply chain.⁹⁸

Deciding who is to speak for indigenous and other claimants to various rights in the forest and developing processes for resolving these conflicts is not straightforward.⁹⁹ Further, despite the expressions of concern at Copenhagen, there was nothing for the indigenous people in attendance. Their issues must be handled in their own national capitals. Deciding to what extent cash pay-

ministrative Law, 115 *YALE L.J.* 1490 (2006); Daniel C. Esty, *Breaking the Environmental Law Logjam: The International Dimension*, 17 *N.Y.U. ENVTL. L.J.* 836 (2008).

98. Bellassen et al., *supra* note 23, at 18-19. For a list of providers, see KATHERINE HAMILTON ET AL., *STATE OF THE FOREST CARBON MARKETS 2009: TAKING ROOT AND BRANCHING OUT* 61 app. (2010).

99. See generally Ctr. for Int’l Envtl. Law, *REDD Legal Issues: Indigenous Peoples and Local Communities* (Mar. 30 2009) (draft report), available at <http://www.reddoar.org/links/DRAFT%20REDD%20Legal%20Issues%2030March%202009.pdf>; see THIAGO CHAGAS, *NON-STATE ACTORS AND REDD: ISSUES SURROUNDING PARTICIPATION OF INDIGENOUS PEOPLE AND LOCAL COMMUNITIES* (2009) (exploring how indigenous groups and NGOs can access the international policymaking process). ANGELSEN ET AL., *supra* note 10, at 91 app. 5 (outlining an approach to indigenous participation in rights determination and REDD). Pablo Reed, *REDD+ and the Indigenous Question: A Case Study from Ecuador*, 2 *FORESTS* 525 (2011) is based on extensive fieldwork.

ments from carbon revenues can effectively substitute for allocations of property rights is uncertain, and may vary from country to country and culture to culture. Amid the slogans there is serious lack of clarity about what rights are being described. If indigenous groups are seeking western style fee simple property rights, what are the prospects that national governments will cede them those rights, along with whatever potential revenues attach to them?¹⁰⁰

Such biological questions as require attention can be addressed by applied research, as needed in local areas. Instead, the questions raised here are all matters of applied social science, law, and public administration. The answers will determine whether a REDD-like program can succeed, in just a few decades, in turning the tide of destruction and degradation that now threatens the tropical forest.

Surely the growing body of research on managing community forests and on common property resources has much to teach.¹⁰¹ Also, the history of institutional adaptation as medieval forest use rights were adapted, abrogated, or survived in the face of economic and political pressures may have much to teach. At a minimum, it reminds us that we have “been there.”

C. *Informal Observations on the Major Policy Challenges*

The above discussion and experiences prompt a few remarks about the overall policy situation facing those who wish to pursue further international efforts to retain tropical forests.

First, the long list of multiple goals, actors, values, and threats to tropical forests complicates any response. The REDD+ agenda amounts to the assertion that all of society's injustices, deprivations, and problems must be solved before we can begin to save the forest. This, simply put, is a recipe for failure. It is impossible to satisfy all these expectations and do it at all once. The number of conflicting performance demands will virtually ensure nothing is done. Not only is the number of tasks in a

100. See Peter Cronkleton et al., *The Devolution of Management Rights and the Co-Management of Community Forces*, in *FORESTS FOR PEOPLE: COMMUNITY RIGHTS AND FOREST TENURE REFORM*, *supra* note 51, at 45 (noting that state have rarely conveyed fee simple rights to communities or indigenous groups under existing programs of devolution of forest management).

101. See *Everyone Agrees on the Need to Save Trees, But the Details are Still Tricky*, *ECONOMIST*, Dec. 19, 2009, at 112; Catherine Tucker, *Learning on Governance in Forest Ecosystems: Examples and Lessons from the CIPEC Program*, 4 *INT'L J. COMMONS* 687 (2010).

given REDD project very large, but the number of actors who must cooperate over long periods is similarly large. It may be premature to broaden REDD, concerned with the global carbon cycle, to REDD+, adding broad areas of social concern in rural landscapes. The “+” in REDD+ may be making it a good deal less likely that any plain-vanilla REDD can ever be accomplished. Overloading the agenda will spread limited resources more thinly, further tax limited management capacity, and grant veto powers to ever-wider groups of stakeholders. Tensions and conflicts among objectives are nothing new in resource management. But decisionmakers in future climate negotiations will have to reckon with some tough choices. The UN community must begin facing them, or face irrelevance. Perhaps it would be wise to make sure REDD is working, before rolling out REDD+ or REDD++.

Easterly, in a recent assessment, observes that economic development programs have been subject to cycles of moving between setting grand goals, then waves of discouragement, followed by the setting of even more grand goals.¹⁰² He terms this pattern “escalation.” The extraordinary list of requirements being posed for REDD programs seems to fall into this pattern.

Indigenous rights advocates should be careful what they wish for. At Copenhagen, “No rights – No REDD” rang in the corridors daily.¹⁰³ But demanding final property rights settlements before moving on REDD is likely to lead to further paralysis, inaction, and continued forest loss.

One blogger asked: “Could there be a more complicated way to save forests?”¹⁰⁴ The answer seems obvious: in the UN system, yes there can! What remains to be demonstrated, however, is whether this system can work.

Many activists, judging by their writings at least, seem to assume that programs to meet all these numerous demands cost nothing. But all of the consultation, planning, negotiating at multiple levels of society, and solving of a multitude of connected

102. Easterly, *supra* note 48, at 391.

103. Also at Cancun, though somewhat more subdued. The Indigenous Environmental Network circulated a pamphlet entitled *Reaping Profits from Evictions, Land Grabs, Deforestation, and Destruction of Biodiversity*, available at <http://iencan.org/REDD/redd/pdf>. A slogan on the back cover has a photo of Uncle Sam pointing at the reader, saying, “We want your land for our climate fraud.”

104. Chris Tobias, *Seeing REDD: Could There Be a More Complicated Way to Save Forests?*, CELSIAS, <http://www.celsias.com/article/seeing-redd-could-there-be-more-complicated-way-sa/> (last visited Apr. 2, 2010).

problems will not be cheap. One writer on carbon law and indigenous rights observes:

The plethora of recommendations contained in this report could prove expensive to implement, both in terms of national or subnational expert investment, and in terms of up front transactions costs for project investors. While clear forest carbon property law may better ensure sustainability in the long run, each new requirement adds extra hoops to jump through, and these may be viewed as impediments to fast, effective projects – particularly where imperiled human and ecological communities are at stake and can benefit *now* from forest carbon investment. How can we formulate excellent law that minimizes overall short-term and long-term costs and maximizes long-term sustainability?¹⁰⁵

Population pressures are extreme in many of these nations. To suppose that available programs can turn aside deforestation and hold the line for a century seems a fantasy. Misgovernment, corruption, poverty and hunger, and absence of rule of law are deeply rooted in our sample of nations. The status quo is profitable and comfortable for ruling elites, for criminals and others operating on the margins of the law, and for their many enablers. The U.S. cannot root out its own mafias and its drug lords. How can this be expected in nations where the phrase “rule of law” is simply a bad joke?

Finding a geographic focus for REDD has been elusive. When the World Bank’s Forest Carbon Partnership Facility began, it hoped to serve 20 nations; the count is now up to 37. Will available resources be spread too thin to make any difference anywhere?

Communiques like the Copenhagen Accord talk with confident vagueness of erecting entirely new entities to manage all of these programs, responding to the unpopularity of existing institutions such as the World Bank. This confidence that entirely new institutions will achieve the success that has thus far eluded existing ones seems to me to be unwarranted.

The hope has been that REDD programs would be funded by sales of carbon credits. As forest credits are not eligible offsets in the European compliance market, development of a U.S. cap

105. TAKACS, *supra* note 63, at 67-68. It may not be fair to task advocates of indigenous rights with preparing detailed cost budgets for implementing their recommendations, but the cost issue is rarely mentioned in that literature. Indicative estimates on some aspects have been mooted. Rough estimates suggest total REDD-readiness costs globally could reach \$4 billion. See ANGELSEN ET AL., *supra* note 10, at 48 tbl.A2.4.

and trade program with tough caps is necessary to generate a large market for carbon credits from tropical forests.¹⁰⁶ At this writing, the prospects for such a program seem dim indeed. This, however, may turn out to be a blessing in disguise. Instead of a premature race to the tropics to secure REDD carbon credits to meet U.S. offset demands, a much more orderly process can now proceed.

Legal complexities in conducting forest carbon offset transactions are extreme. We are talking about 100-year transactions in carbon property rights in nations where familiar western notions of property rights are absent. This fact, together with all of the above conditions, convinces me that the sooner we de-couple tropical forest conservation from payments for carbon offset credits, the better.

Finally, we are expected to believe that simply by offering payment for carbon rights, countries with abysmal records of forest stewardship will suddenly see the error of their ways and quickly repair them. Experts on REDD and tropical forests understand all these realities very well.¹⁰⁷ What is uncertain is whether those who issue grand Accords and Protocols understand them. Thus far, it would seem not. Those big trees, which loomed like royalty in Conrad's masterpiece, confront an increasingly precarious future. At this moment, these kings are falling.

V.

CONCLUSION

Viewing the many values of the Global Commons embodied in the tropical forest, the tragic social injustices and hardships endured by the indigenous inhabitants, and the pace of deforestation, a sense of urgency is understandable. Who would not want deforestation to cease? To view the atmosphere as a Global Commons, requiring a collective approach to its management, is only common sense. As a literary conceit, and indeed as a moral imperative, the concept of the tropical forest as a Commons, a "common heritage of humankind" is also compelling. There is a certain elegance in envisioning a means of solving both problems at once through a global carbon policy framework and a set of market-like implementing mechanisms. Yet, trying to work

106. See HAMILTON ET AL., *supra* note 19, at 20.

107. For one example, see C.P. Hansen et al., *Neither Fast, Nor Easy: The Prospect of Reduced Emissions from Deforestation and Degradation (REDD) in Ghana*, 11 INT'L FORESTRY REV. 439 (2009).

through a way in which the world community (perhaps another literary conceit) can actually manage these forests to sustain their contribution to the global environment and to local communities has proven to be challenging. In fact, it is probably one of the grand challenges of the 21st century.

The many challenges involved in slowing tropical forest loss and degradation suggest several more specific conclusions. First, analysts projecting future carbon emissions should take care not to overestimate results of tropical forest programs in reducing CO₂ emissions from forests. Second, analysts of carbon legislation, in the U.S. and elsewhere, should not overestimate the volumes of credits likely to be certified under REDD programs in the first few decades. Third, the costs of making such credits available may be higher than currently expected.

Attempting to connect the Commons of the atmosphere to the Commons of the tropical forest is bold indeed. But if managing the tropical forest as a Commons in order to stabilize the CO₂ content of the planet's atmospheric Commons is to become anything more than an enticing metaphor, serious problems of tenure rights, government effectiveness, unprecedented pressures of hunger, poverty, and social disorder, and overall macroeconomic stability must be solved. The Gordian knot of complexity in terms of multiple goals, multiple actors, and multiple threats must be cut somehow. The hope that all this would be financed by carbon credits purchased by western fossil fuel users needs to be set aside — perhaps permanently.

Today and for a generation hence, the institutions — whoever they are and wherever located — charged with managing the two Global Commons discussed here must face this question as a working hypothesis:

The combined efforts of the industrial world, together with the major tropical forest nations, can protect sufficient tropical forest to make a meaningful difference to the global climate; that this can be done soon enough to matter; and that those protections can credibly extend forward in time over several generations to be deemed permanent.

A sober reading of the facts reviewed here would lead an observer to conclude that, unless dramatic changes occur, this hypothesis must be rejected. Even where circumstances appear most favorable, a heavy burden of proof demonstrating feasibility and permanence must be met. At a minimum, hoped-for timetables may not be realistic. Compared to the major chal-

lenges facing those concerned with conserving tropical forests, the programmatic puzzles of REDD design seem tractable in comparison.

When we widen the angle of view on tropical forests, the issue becomes larger still. Of the forces driving deforestation, some are indigenous to the tropical nations; others are not. What are the prosperous nations willing and able to do to address the growing demands for tropical products that underlie forest loss in so many areas? As one group of experts has noted:

Finally, it is also necessary to change models of individual and collective consumption: forests are converted to respond to increasing demands for beef consumption which in turn fuel soy production that merely serves as cattle fodder; demand for palm oil and sugarcane is stimulated by demand for biofuels; and increasing paper consumption leads to clearing degraded forests in Indonesia so as to plant fastgrowing species. Certification labels and economic instruments alone cannot save the world's tropical rainforests.¹⁰⁸

108. Alain Karsenty et al., *Summary of the Proceedings of the International Workshop "The International Regime, Avoided Deforestation and the Evolution of Public and Private Policies Towards Forests in Developing Countries" held in Paris, 21-23rd November 2007*, 10 INT'L FORESTRY REV. 424, 428 (2007). See also ENVTL. INVESTIGATION AGENCY, PUTTING THE BRAKES ON DRIVERS OF FOREST DESTRUCTION: A SHARED RESPONSIBILITY (2009).