

**Climate Change and the
Forestry Sector:
Possible Legislative Responses
for
National and Subnational
Governments**

by

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SONYA: ... Mihail Lvovitch plants fresh trees every year ... He tries to prevent the old forests being destroyed. If you listen to him you will agree with him entirely. He says that forests beautify the country, that they teach man to understand what is beautiful and develop a lofty attitude of mind. Forests temper the severity of the climate. In countries where the climate is mild, less energy is wasted on the struggle with nature, and so man is softer and milder. In such countries people are beautiful, supple and sensitive; their language is elegant and their movements are graceful. Art and learning flourish among them, their philosophy is not gloomy, and their attitude to women is full of refined courtesy.

....

[MIHAIL LVOVITCH] ASTROV: ... I am ready to let you cut down wood as you need it, but why destroy the forests? There are fewer and fewer forests, the rivers are drying up, the wild creatures becoming extinct, the climate is ruined, and every day the earth is growing poorer and more hideous. ... Here you are looking at me with irony, and all I say seems to you not serious and — perhaps I really am a crank. But when I walk by the peasants' woods which I have saved from cutting down, or when I hear the rustling of the young copse planted by my own hands, I realise that the climate is to some extent in my power, and that if in a thousand years man is to be happy I too shall have had some small hand in it.

From Act I of the play *Uncle Vanya*, by Anton Chekhov (1900), as translated from the Russian by Constance Garnett (1923)

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Summary

This paper examines the developing law of climate change and discusses what issues legislative bodies may have to consider regarding climate change mitigation and forests.

Climate change presents the world with a daunting problem. Emerging science suggests that humans may be about to cause a major change in world climates. The economic and ecological stakes are high. In an ideal world, mature science would guide policy and legal reform. In the real world, we do not always have the luxury of certainty. Responding to the challenge will require pioneering efforts in science, pollution control, land management, and law.

Scientists believe that increased atmospheric levels of greenhouse gases, including carbon dioxide, contribute to climate change. Human activities such as burning fossil fuels and deforestation add greenhouse gases to the atmosphere. Forests are net carbon sinks. That is, a growing forest can remove carbon dioxide from the atmosphere.

Under the Framework Convention on Climate Change, the international community has committed to reducing net greenhouse gas emissions. The Kyoto Protocol to the convention would give developed countries specific reduction targets. They could meet these targets by reducing emissions or by promoting sinks. The reductions could be accomplished internally or through co-operative actions involving other parties to the convention.

Forests would thus appear to have a major role to play in the international response to climate change. However, the many parties to the Convention might reach different conclusions regarding the role of forests and appropriate legislation to foster that role:

- First, obligations of parties will differ, particularly between developed nations (Annex I parties) and other nations.
- Second, the role of forestry projects to counterbalance existing emissions is controversial. Some fear over-reliance on such projects could hamper industrial development.
- Third, the rules for multi-party mitigation projects and trading of emission reduction obligations are still unsettled.
- Fourth, the legal issues raised by forest mitigation will overlap with legal issues raised by larger issues of mitigation and compliance.
- Fifth, the approaches taken will vary depending on local institutions, laws, and needs.
- Sixth, the role of national legislation in compliance (versus international standards set by the parties) is still unclear.

To date, national legislative activity on the issue of forests and climate change has been slight. Countries have relied more on creative use of existing legislation than creation of new legislation.

There are a few exceptions to this observation. Costa Rica has created a Certified Tradable Offset to attract developed nations looking to sponsor mitigation projects. The first project

funded under this mechanism has involved forests. The state of New South Wales in Australia has changed its property laws to recognize a separate legal interest in the carbon sequestration potential of forest land. The Dominican Republic has adopted a law that will allow it to create incentives for managing forests for environmental services such as carbon sequestration.

The possible issues that could arise in new legislation are broad. A nation interested in developing market-based systems to promote carbon sequestration in forests may have to address issues such as these:

- Who owns the carbon sequestration potential and can that ownership be transferred?
- How is the size of the potential to be determined?
- How can the government promote orderly sales or other transfers of potential ownership?
- How will the law allocate the risk of failure of carbon sequestration projects?
- Will the law assess liability for damaging a forest's carbon sequestration potential?

If a nation wishes to take a regulatory approach, at least three avenues are open to it. It can regulate forest use and management directly. For example, it could limit harvests or require prompt reforestation of harvested or degraded areas. It can regulate the manufacture and use of forest products, aiming at reducing waste and decay. Or it could regulate greenhouse gas producers in ways that encourage them to invest in greenhouse gas sinks.

Nations could also promote the use of forests as sinks through subsidies. These may be payments, goods, or services given to forest landowners to promote management for sequestration. The subsidies could also be in the form of government acquisition and management of lands, or of partial interests in lands. Governments could also spend money on enforcement of general forest protection laws.

Finally, governments could try to promote forest carbon sequestration using informational mechanisms. These range from informing landowners about management options and advantages, to informing manufacturers and consumers of forest products on ways to reduce waste, to certifying the success of private sequestration efforts.

Until the role of forests in meeting sequestration goals becomes clearer, the role of legislation in this area will also be unclear. However, deadlines under the Kyoto Protocol are tight, and parties should be thinking now about how or whether to encourage the use of forests as carbon sinks.

Acronyms

AIJ	Activities Implemented Jointly
CAP	Common Agricultural Policy (EC)
CCAP	Climate Change Action Plan (USA)
CCB	Certificate for forest conservation (Costa Rica)
CDM	Clean Development Mechanism
CERCLA	Comprehensive Environmental Compensation, Liability, and Response Act (USA)
CO ₂	Carbon dioxide
COP	Conference of the Parties (to the FCCC)
CTO	Certifiable Tradable Offset
EC	European Community
FAO	Food & Agriculture Organization
FCCC	UN Framework Convention on Climate Change
FONAFIFO	National Fund for Forestry Finance (Costa Rica)
GERT	Greenhouse Gas Emission Reduction Trading (Canada)
GHG	Greenhouse gas
INAREF	National forestry agency, Dominican Republic
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standards
JI	Joint Implementation
KP	Kyoto Protocol (of the FCCC)
NGO	Non-governmental organization
OCIC	Office on Joint Implementation (Costa Rica)
UN	United Nations
USA or US	United States of America
USC	United States Code

I. Introduction

This paper examines the growing international law on climate change and forecasts what issues may come before legislatures concerning forests as carbon sinks. This first introductory section of the paper offers some basic information on climate change and the international legal response. The second section reviews some early national responses related to forests. The third section considers some of the general legal issues that may come up regarding forests and climate change mitigation.

A. Greenhouse Gases and Forests

Greenhouse gases (GHGs) play a key role in the Earth's climate. Energy from the sun that passes through our atmosphere warms the surface of the Earth. Some of that energy radiates back towards space from the surface as infrared light. GHGs absorb or reradiate the infrared light, preventing the energy from travelling out into space. Without GHGs, the planet would be too cold to sustain its current life. Increases in GHG levels could make the planet grow warmer. According to the current understandings of world climate, such warming would also change patterns of precipitation and the intensity of storms. Human understanding of the global climate system is imperfect, so it is impossible to predict with precision how the climate would change. However, most scientists studying the subject predict warming would bring significant adverse effects (IPPC, 2001).

The concentrations of GHGs, notably of carbon dioxide (CO₂), are clearly increasing. The cause is human activity. Human industries now add about 5 gigatons of carbon as CO₂ to the atmosphere each year. Human land clearing adds another gigaton per year. Though the total amount of carbon in the atmosphere is around 750 gigatons, the human sources are causing measurable increases in CO₂ concentrations (American Petroleum Institute, 1999).

In nature, GHGs are constantly entering and leaving the atmosphere. The oceans exchange CO₂ and other GHGs with the atmosphere. Trees and other green plants take CO₂ from the atmosphere, combine it with water, and create simple sugars. These become the building blocks and energy supply for most of life on Earth. When plants and animals respire, they return CO₂ to the atmosphere. When wood or other organic material burns or decomposes, that also releases CO₂.

People concerned about climate change from GHGs have sought to reduce the emissions to the atmosphere and to increase the withdrawals. Much attention has focused on major human sources, particularly the use of fossil fuels. However, forests are drawing attention, too.

Afforestation, reforestation of presently deforested areas, and prevention of deforestation all increase the amount of carbon held in forests. These are widely acknowledged as potential means of offsetting a part of human GHG emissions. Their relatively low cost, compared to other offset options, may make them economically attractive (Dayal, 2000).

Sustainable production of fuel from forests can displace the use of fossil fuels. Although burning of biomass fuels releases CO₂, the regrowth of the forest offsets that release. Thus, forest fuels can supply energy with far lower net contribution to GHG levels than fossil fuels can.

Humans can also vary the way they manage forests to increase the carbon storage on site. For example, selective cutting schemes, reduced-impact logging and other measures may maintain a higher average level of sequestered carbon compared to clear-cutting schemes. However, simply not harvesting can sometimes be the better way to sequester carbon (Schulze et al., 2000).

B. The International Legal Response to Climate Change

Climate change is a global problem. The greenhouse effect reflects global increases in GHG concentrations. It does not matter where on Earth the GHGs originate; the effect on climate is essentially the same. Any effort to manage those concentrations must be global.

The international community, encouraged by the United Nations General Assembly, produced the United Nations Framework Convention on Climate Change (FCCC). The FCCC was signed at the United Nations Conference on Environment and Development in 1992. As of September 2000, 186 nations have ratified or acceded to the convention, and it has taken effect in March 1994.

The parties to the FCCC have met in an ongoing series of Conferences of the Parties (COPs) addressing GHG issues. The third COP produced the Kyoto Protocol in December 1997. As of February 2001, 32 parties have ratified the Kyoto Protocol, yet not enough for it to go into effect. However, it reflects the mainstream thinking of the international community on climate change.

C. Forest-Related Obligations of Parties

The FCCC and Kyoto Protocol together will obligate the parties to take steps to reduce or mitigate GHG emissions. The parties continue to meet and discuss points at issue, and the international law in the field continues to develop. The presently agreed-upon obligations that relate to forests are summarized below. Some obligations apply to all parties to the agreements. Some apply particularly to developed nations, as listed in the agreements' annexes. Some are of more interest to developing nations.

Obligations of All Parties

Under Article 4 of the FCCC, all parties must:

- develop and update inventories of emissions and removals of GHGs. These include emissions from deforestation and removals from forest growth. They also would include emissions from the burning or decomposition of forest products;
- develop programmes to mitigate climate change, including efforts to address emissions and sinks;
- promote technologies that lead to lower GHG emissions. This subparagraph of the FCCC specifically mentions the forestry sector;

- promote sustainable management of sinks and reservoirs. Again, the FCCC specifically mentions forests;
- prepare to adapt to the impacts of climate change, and develop appropriate plans for areas that might be affected by flooding, drought, or desertification. Though the FCCC does not expressly mention forests with this requirement, they are a special concern. Vegetation cannot migrate like some animals can, and trees may live long enough to suffer the effects of human-induced climate changes.

Article 10 of the Kyoto Protocol clarifies some of these requirements. Among other things, it directs the Conference of the Parties to develop guidelines on inventory methods. Also, it expressly mentions that programmes to mitigate climate change would include the forest sector.

Obligations of Developed Parties

The FCCC drafters reasoned that because the developed nations were responsible for most of the increases in atmospheric GHG concentrations, they should bear a greater burden in reducing GHG emissions and increasing sinks. In its Annex I, the FCCC lists 36 nations that will bear this higher burden. These nations include almost all of Europe, including the European nations of the former Soviet Union, but excluding Albania and the nations emerging from pre-1990 Yugoslavia. Annex I also includes the United States, Canada, Australia, New Zealand, Turkey, and Japan.

Under Article 4 of the FCCC, these Annex I nations commit to adopting policies to limit GHG emissions and protect and enhance sinks and reservoirs. Specifically, these policies are to aim to return net emissions to 1990 levels.

The Kyoto Protocol makes this obligation stronger and much more specific. Kyoto Protocol Article 2 directs Annex I nations to protect and enhance sinks and reservoirs; promote sustainable forest management, afforestation, and reforestation; and reduce incentives and subsidies that run counter to the objectives of the FCCC. Kyoto Protocol Article 3 tightens the FCCC's emissions goal, calling for reduction of aggregate emissions overall to 5% below 1990 emissions. In its Annex B, the Kyoto Protocol sets out a revised list of FCCC Annex I nations, dropping Czechoslovakia, Belarus, and Turkey and adding Croatia, the Czech Republic, Liechtenstein, Monaco, Slovakia, and Slovenia. Each nation in Annex B has a specific goal for percent reduction below the 1990 baseline. For most nations, that goal allows net emissions of 92% of the baseline year.

Further, Article 3 of the Kyoto Protocol sets out a time frame for achieving these reductions. The formal commitment period is the five-year span from 2008 through 2012. Parties must show progress towards the goal by 2005.

Also worthy of note, the FCCC commits the most highly developed nations, listed in Annex II, to give developing countries financial and technical assistance to implement the convention and deal with the effects of climate change. FCCC Article 4 paragraphs 3 through 5 obligate the developed nations to assist developing nations through funding for emissions reductions, funding for adaptation to adverse effects, and transfer of environmentally sound technologies.

Co-operative Implementation

Several provisions in the FCCC and Kyoto Protocol provide for nations working co-operatively to achieve GHG emission reductions or promote GHG sinks. The FCCC states that Annex I parties can return to their 1990 GHG emission levels “individually or jointly” (Article 4, subparagraph 2(b)), and that parties could implement national climate change mitigation policies jointly (Article 4, subparagraph 2(a)). At the time it was signed, the parties had some internal disagreements about the role of joint implementation (JI). The convention expressly directed the Conference of the Parties to develop criteria for JI (Article 4, subparagraph 2(d)). The parties agreed to a pilot phase to test the feasibility of activities implemented jointly (AIJ).

The Kyoto Protocol begins to set up a framework for the transfer of emission credits between parties, but it leaves some uncertainties. Articles 4, 6, 12, and 17 contemplate transfers. Article 4 deals with agreements between Annex I parties and how those agreements affect the reduction obligations of the protocol. Article 6 allows Annex I parties to transfer “emission reduction units” and allows parties to authorize “legal entities” to participate in such transfers.

Kyoto Protocol Article 12 introduces the clean development mechanism (CDM). The CDM is a body under the authority of the COP and supervised by an executive board. The CDM will promote joint projects involving Annex I and non-Annex I parties. Reductions resulting from these projects, beginning in the year 2000, count towards satisfying the Annex I party’s obligations to reduce aggregate emissions during the years 2008 to 2012. To count, an entity approved by the COP must certify the project’s reduction.

Finally, Kyoto Protocol Article 17 directs the COP to define the rules for emissions trading among Annex B parties.

D. Complications for Potential National Legislation

What approach might legislatures use to promote the use of forests as carbon sinks? The complexities of the FCCC and Kyoto Protocol, the issues that the agreements fail to fully resolve, and the nature of forest mitigation projects all make it difficult to give a general answer to this question.

First, the FCCC and the subsequent Kyoto Protocol create different obligations for different parties. Because the developed nations have historically emitted the majority of GHGs believed to drive climate change, they bear the primary burden of reducing emissions under the FCCC. Some of the more extensive legal reforms will probably have to occur in these nations.

The developing nations will have different sorts of compliance questions, many arising out of projects undertaken jointly with developed nations. These questions may require a wide set of legal skills and institutional expertise to answer. Some of the issues may be conventional matters of improving approaches to forest conservation. Some may involve new ways of looking at property ownership, risk allocation, and liability.

Second, questions remain about the role of forestry projects as mitigation. Although the concern of the FCCC is net emissions of GHGs, the Kyoto Protocol appears to set some limits on which forestry emissions and sinks count towards fulfillment of treaty obligations. Article 3, paragraph 3, of the Kyoto Protocol states:

The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use changes and forestry activities, *limited to afforestation, reforestation and deforestation since 1990*, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each Party included in Annex I. [Emphasis added.]

At least two other classes of forest activity might affect net GHG emissions. One activity is forest management. Selective harvesting, maintenance of large trees on site, or exclusion of fire and disease might make a forest a better carbon sink. The science in this area is young and technical understanding is still developing. The other activity is land protection. By legal or institutional controls over land use, a government can protect land that would likely otherwise be deforested.

Other articles of the Kyoto Protocol dealing with joint activities (i.e., Article 6 on trading among Annex I parties, Article 12 on the CDM, or Article 17 on emissions trading) include no limits on forestry projects or do not mention forestry at all. This has led to different interpretations of the Protocol concerning the role of forestry. Some read the Protocol narrowly (presuming forestry not to qualify as mitigation unless expressly allowed) and others read it broadly (allowing forestry projects of all kinds, unless expressly limited).

The ambiguity results from genuine disagreements among the parties on the role of forestry. Some developing countries fear that forestry could become too important a mechanism for mitigating GHG emissions. They would rather see mitigation projects take the form of investments in highly efficient industrial technology that would help speed their development. They therefore pressed for limits on the use of forestry in the Protocol, but did not succeed in having limiting language adopted everywhere in the Protocol.

Other parties and observers have raised concerns about the ability to measure and document the GHG reductions that forestry and land use projects bring about. For example, what credit should a party get from creating a forested reserve? Without knowing with certainty what would have become of the land without the reserve or how effective laws and institutions will be in protecting the forest in the reserve, how can we establish the value of the reserve as a mitigation measure?

Further uncertainty stems from questions about the meaning of terms like forest, afforestation, reforestation and deforestation. FAO has entered this discussion, offering a definitional scenario. The Intergovernmental Panel on Climate Change, the official scientific support arm of the FCCC, has recently issued a paper discussing the definitional and accounting issues surrounding land use, land-use change, and forestry (IPCC, 2000). That report may help the parties resolve some of the ambiguities. At the Conference of Parties in November 2000, the parties grappled with some of these definitional issues. Though the parties reached no formal agreement, the president of the conference, in an informal note, suggested the parties could adopt the FAO definition of forest and the IPCC definitions of afforestation, reforestation, and

deforestation (COP, 2000). As of this writing, this proposal is still pending, and the dialogue continues.

Third, questions remain about mitigation projects involving multiple countries. Joint implementation is controversial in large part due to the potential role of forest management and other carbon sink activities. As discussed above, some people believe that investments in carbon sinks do not contribute to economic development as much as investments in industrial efficiency. Some officials in developing countries fear that joint implementation could tie up their lands in low-productivity uses and hinder rather than help their economic development. Proponents of forest development think that many of these fears are unfounded, but the difference in views continues to cast uncertainty over joint implementation's ultimate role.

Fourth, the legal issues concerning forest mitigation will overlap with legal issues concerning other forms of mitigation and compliance generally. For example, if a country wishes to set up a GHG emissions and mitigation trading system, the system will have to deal with all kinds of sinks and all kinds of sources, from farms to factories, not just forests. As discussed in more detail in the third part of this paper, countries will encounter some legal issues that are unique to forests and others that apply to a broad range of sinks. Some legal issues may be seen as "forest law" matters while others may be considered issues of property law or laws governing investments and financial transactions.

Fifth, the direction of legislation will vary depending on the local legal system and institutions. A legal system that recognizes social property and community ownership will offer different options than one that does not. In a society where the fiscal institutions are weak or untested, it may be impractical to establish mitigation programmes based on market trading. These kinds of problems are familiar to legislative drafters, but GHG mitigation may raise them in new contexts.

Sixth, the role of national legislation in compliance is still unclear. Only a few countries have made legislative changes in response to climate change concerns. Others have responded through policy changes and administrative acts under existing laws rather than through new legislation. As the international response continues, with experience gained and deadlines approaching, legislation may become more important.

II. Some National Legal Responses to Date

As one authority described them, the national responses to climate change have been a mile wide and an inch deep (Mark Trexler, quoted in Anonymous, 1998). Parties to the FCCC have produced detailed reports on their activities. In many cases, however, the reports do not reflect activities initiated through new legislation. Rather, the reports describe ongoing efforts that incidentally may have beneficial effects on climate change. In some nations, the most striking new initiative is simply the effort to produce the report itself.

To date, few national laws or institutions specifically aim at forest-based greenhouse gas mitigation. Some legislation endorses the use of forests as greenhouse gas sinks or declares a policy of forest-based mitigation but has no specific effect. Some general forestry laws may have mitigation as an incidental purpose, but may result in projects indistinguishable from forestry projects carried out in traditional programmes. Some nations may have nothing in law

that mentions forests as greenhouse gas sinks, but they can and do claim credit for beneficial forestry projects carried out under laws and institutions that predate the FCCC.

A. *The United States of America*

The United States of America offers an example of a national response. The 1997 report of the United States Department of State to the FCCC Secretariat runs to almost 300 pages, detailing existing conditions, emissions, sinks, and active programmes to slow greenhouse gas accumulation in the atmosphere. It does report on new government action, but little of that response is due to new legislation.

The report describes the USA's 1993 Climate Change Action Plan (CCAP). CCAP brings together the president's Council on Environmental Quality with the U.S. Environmental Protection Agency and the departments (ministries) of Energy, Commerce, Transportation, and Agriculture. The latter has jurisdiction over forestry and the publicly owned lands in the national forest system. CCAP was established by executive action, announced by the President, not through statute.

The 1997 report discusses the US Initiative on Joint Implementation. This entity promotes and tracks co-operative international projects involving US partners. It is based in the State Department but also involves the Environmental Protection Agency, the Department of Energy, and the US Agency for International Development. It too seems to have been created through executive reorganization rather than through legislation.

There are legislatively created institutions dealing with climate change in the USA, but they were not necessarily created in response to the FCCC. The Department of Agriculture has a Global Climate Change Program mandated by 7 USC §6701. This law was part of the Global Climate Change Prevention Act of 1990, obviously too early to be a response to the FCCC. Another 1990 act created the United States Global Change Research Program (15 USC §2933).

The USA's 1997 report describes the Federal Agriculture Improvement and Reform Act of 1996 (1996 Farm Act). This Act phases out certain agricultural price supports and subsidies. The report implies that this may encourage farmers to take marginal lands out of production. The report names several federal programmes (most created before the 1996 Farm Act) that will give farmers technical or financial assistance for returning such lands to forest cover. These programmes include the Conservation Reserve Program, the Forestry Incentives Program, the Stewardship Incentives Program, and the Environmental Quality Incentives Program.

A diligent reader will discover, many pages deeper in the report, that the 1996 Farm Act actually terminated the Agriculture Conservation Program, which had been encouraging farmers to take marginal lands out of production since 1936. The effectiveness of the various remaining federal reforestation programmes depends largely on how much money the U.S. Congress chooses to allocate to them on a year-to-year basis.

A search of legislation in the 106th sitting of the US Congress (1999 to 2000) bears out the importance of annual "appropriations" bills that allocate funds to these and other programmes.

A search for legislation on the Library of Congress's web site (<http://thomas.loc.gov>) produces 50 bills from the 106th Congress including the phrase "climate change." Of these, almost half are appropriations bills, allocating money to existing programmes. Most appropriations bills eventually became enacted into law, either in their own right or consolidated with other appropriations bills.

In contrast, the 106th Congress enacted few bills to create new climate change programmes. Two bills that did not become law had particular relevance to forests. One, the Domestic Carbon Storage Incentives Act of 2000 (Senate Bill 2540) would have directed the Secretary of Agriculture to give financial and technical support to landowners who volunteer to commit their land to carbon sequestration projects for at least ten years. Another, the Forest Resources for the Environment and the Economy Act (Senate Bill 1457), was intended to promote management of public lands for carbon storage and to support carbon sequestration on private forest lands through technical assistance and loans. These bills remained "in committee" and died with the close of the legislative session.

This is not to say that the USA has failed to act. As the 1997 report describes, the country has creatively used existing laws, aimed at environmental protection, conservation and energy efficiency, to promote GHG mitigation.

A provision in the Energy Policy Act of 1992 (sec. 1605(b)) encourages people to report to the government voluntarily any GHG reductions they create. The government may eventually recognize these reductions under future GHG reduction programmes. In 1999, the government's database received reports of 241 domestic and 61 international forestry projects, claiming a total sequestration of over nine million metric tons of CO₂ (US Energy Information Administration, 2001).

Also, the USA has tried some innovative laws on the subnational level. The state of Oregon has integrated carbon sequestration into one of its reforestation efforts. The state has created a Forest Resource Trust to finance reforestation efforts on privately owned land in return for a limited interest in the income from commercial harvests (Oregon Revised Statutes §§526.700-775). An administrative rule requires landowners using money from the Trust to give the Trust ownership of any carbon offsets created through the reforestation (Oregon Administrative Rules §629-022-0700(2)).

Oregon also considers CO₂ emissions in deciding whether to allow construction of new electrical power generation plants (Oregon Administrative Rules §§345-024-0500 et seq.). In a recent plant approval, the state accepted the plant owner's payment to the Forest Resource Trust as creating a quantifiable, verifiable offset (Cathcart, 2000).

B. The European Community

The European Community offers another example of extensive reported activity (EC, 1998) but little new legislation. The EC stands out as a party to the FCCC, being a multinational entity rather than a single nation. It has authority to adopt regulations, which are binding on its member nations.

EC's main legislative effort concerning forests is related to its Common Agricultural Policy (CAP). CAP was adopted in late July of 1992, not long after the UN Conference on Environment and Development where the FCCC was signed, but well before the EC ratified the FCCC in December 1993. The policy offers financial support for afforestation of agricultural land and silvicultural actions that may increase carbon sequestration. The EC also offers to share the cost of forest fire prevention projects, supports monitoring of the effects of air pollution on forests, and supports general forestry research (EC, 1998).

C. Costa Rica

Costa Rica offers an example of a more activist approach to GHG forest mitigation legislation. Not being an Annex I nation, Costa Rica has no quantified reduction goal for GHGs under the FCCC. However, its political stability and reputation for environmental stewardship have made it an attractive partner for AIJ projects. Costa Rica has signed bilateral agreements concerning GHG projects with the USA, Norway, Switzerland, Finland, the Netherlands, and Mexico.

In 1995, Costa Rica created an Office on Joint Implementation (OCIC). OCIC came out of an agreement signed by the Ministry of Environment and Energy with two private sector groups representing industrial and financial interests and one non-governmental organization with expertise in forest protection.

In 1996, Costa Rica passed a new forestry law (No. 7575). Article 69 of the law dedicates a third of the national tax on hydrocarbons for forest conservation. This income is to compensate for the environmental services that forests provide, including mitigation of gas emissions. Article 46 of the law creates the national forest finance fund (FONAFIFO). Article 22 allows FONAFIFO to issue forest landowners certificates for forest conservation (CCBs) representing payment for environmental services. The landowners can use CCBs to pay taxes and other fees owed to the government.

A 1996 executive decree set up a National Specific Fund for the Conservation and Development of Sinks and Deposits of Greenhouse Gases. Income from the sale of GHG mitigation services goes into the fund. The government spends the fund on support of local AIJ projects.

To make the offsets more attractive to potential investors, Costa Rica has created a tradable security, known variously as a Greenhouse Gas Mitigation Certificate or a Certifiable Tradable Offset (CTO). CTOs represent specific levels of GHG reduction or mitigation, expressed as equivalent amounts of carbon removed from the atmosphere. The government has designed the CTO to be independently verifiable and to meet any technical or procedural requirements of the FCCC.

Costa Rica issued its first CTOs in 1997 to the Government of Norway and a consortium of private Norwegian companies. The CTOs represented credit for 200,000 metric tons of carbon offset through a reforestation and forest conservation project.

Costa Rica also enacted a new law on the Use, Management, and Conservation of Land in 1998 (Law No. 7779). The Government, in a report on FCCC implementation activities,

pointed to this law as promoting reforestation of degraded forests and preventing degradation of existing forests (Costa Rica, 1999). However, the text of the law does not appear to speak specifically to climate change issues.

D. Australia

In November 1998, the state of New South Wales in Australia passed the Carbon Rights Legislation Amendment Act (No. 124). This law aims to create a tradable interest in the carbon sequestration potential of forests. It recognizes a carbon sequestration right as a form of forestry right. Forestry rights are conveyable interests in land. They may create a *profit à prendre*. In the case of a carbon sequestration right, this is not a right to remove natural products from the land so much as a right to claim the benefits from the carbon sequestration. The Act also recognizes that a forestry covenant associated with a property may provide access to or guarantee maintenance of the forest on land subject to a carbon sequestration right. The Act expressly allows the state's Forestry Commission and electricity generators and distributors to hold and trade carbon sequestration rights.

According to Lee (2000), the state forestry agency in New South Wales has contracted with Tokyo Electric Power Company to sequester carbon in a "planted forest estate." Planting the first year will cover 1000 hectares, with between 10,000 and 40,000 hectares to be planted over the life of the agreement. Lee also reports that the Sydney Futures Exchange is working with the state government to develop a market for carbon credits.

E. Canada

Canada has launched an experimental programme that may deserve attention of developed countries seeking to meet GHG reduction goals. In 1998 eight provinces and the federal government of Canada entered into a memorandum of understanding creating a Greenhouse Gas Emission Reduction Trading (GERT) pilot project. GERT is designed to give members practical experience in emission reduction training and build the foundation for a possible future trading system. Several industry and environmental groups are also participants in the project, which is described in Bisson (2000) and on the GERT web site (<http://www.gert.org>).

Parties wishing credit for GHG reductions submit proposals to GERT's steering committee. Among other things, GERT requires that GHG reductions must be measurable and verifiable, and must exceed any reductions mandated by law.

GERT projects may include reductions in emissions as well as sinks. One of the first projects reviewed by GERT involved substituting wood waste for natural gas to power industrial boilers at a facility in British Columbia. Projects awaiting review include a carbon sequestration project of the province of Saskatchewan's Ministry of Environment and Resource Management, which wishes to claim credit for creating new white spruce plantations and for creating a new forest reserve on land formerly available for timber harvest.

F. Dominican Republic

In December 1999 the Dominican Republic enacted a new forest law (Ley 118-99). Article 95, paragraph I, of the law allows the national forestry agency, INAREF, to adopt regulations creating special incentives to promote the valuation of the environmental services of forests, including carbon fixation. The State will also issue Negotiable Certificates of Reimbursement to finance 80% of the expenses of capital and investments made in the establishment and handling of plantations, management, and protection of forests. The expenses include payment of all the existing taxes.

III. Possible Legal and Institutional Issues for Governments

The legal issues that compliance efforts will raise will depend on the particular nation's obligations under the FCCC and Kyoto Protocol. The strength of interest in particular issues will differ as well.

For example, an Annex I nation trying to meet a specific reduction goal may be interested in a tax or regulatory system to reduce emissions coupled with market measures to reduce costs of compliance. The market measures may demand new laws concerning ownership of carbon sink potential.

In contrast, a non-Annex I party, with no goal to meet, may be more interested in making changes that might attract CDM investments. Still, the non-Annex-I nation may also be interested in new laws concerning ownership of carbon sinks to make investment in forest projects more attractive. If the COP counts improvements in legal and institutional provisions for afforestation or against deforestation, parties may be interested in these kinds of measures.

Some legal and institutional issues that forest projects might raise will be common to other kinds of GHG mitigation projects. Therefore, general laws might address those issues. For example, the question of liability for a failed, jointly implemented forestry mitigation project might be determined by a general rule that applies to all kinds of mitigation projects.

Legal and institutional issues will arise directly under the FCCC and Kyoto Protocol or they may arise under national laws. The same sorts of issues could arise in both circumstances, but they might be handled under different standards or through different institutions. For example, Nation X might transfer emission reductions to Nation Y through the CDM so that Nation Y can comply with the emission reduction goals in the Kyoto Protocol. If Nation X does not reduce its emissions to cover the transfer, international law, eventually to be set by the COP, will determine the liability of the parties and whether one or both have violated the Kyoto Protocol. If, within a nation, Corporation X sells an offset to Corporation Y and then Corporation X fails to reduce its emissions or create a sink, then national law will spell out the liabilities of the parties.

The discussion below focuses on issues of national law. It outlines the sorts of legal issues that might arise in a country trying to encourage use of forests as GHG sinks.

It begins by considering issues that might arise under market-based approaches. "Ownership" of forests and forest products, whether private, social, or state-based, is the oldest and still

most prevalent legal mechanism for allocating forest resources and encouraging their sustained use. However owning an intangible resource like carbon sink potential poses new challenges to old systems of property law.

The discussion then considers regulatory approaches. These might include regulation of forest use or conversion and regulation of the manufacture, use, or disposal of forest products.

The third set of issues discussed arises out of subsidy-based approaches. These issues may be the most familiar to forest managers today. The legal issues that arise out of government spending to promote GHG mitigation will be similar to the issues arising out of other government spending to promote good forest stewardship.

The final set of issues considered below is information-related. They involve attempts to promote education, product labelling or certification, and government evaluation of management systems.

A. Market-Related Issues

In the climate change context, markets offer solutions that are strong but imperfect. Markets can create incentives and encourage voluntary participation in mitigation activities. Through social ownership, markets can empower local communities and blend with traditional rights. They can serve to both promote mitigation and fight poverty.

Market solutions can also have side effects. They must be carefully tuned to promote mitigation, or they will promote accumulation of wealth regardless of its consequences. They can attract corruption. They can catalyze unexpected social change. And though they may look good on paper, the fiscal, governmental, and cultural structures necessary to allow markets to work may be absent.

Thus, markets are not panaceas. However, they offer intriguing possibilities. It is worth considering the legal issues that may arise in using market mechanisms to promote forests as climate-stabilizing tools.

(1) Ownership

Who owns the carbon sequestering potential of a forest? The obvious answer is, the owner of the forest. However, the obvious answer is far from the only possible answer. Here are some possible ownership systems:

I. The owner of the property owns the potential and —

A. The potential does not exist as a separate property right. The property owner cannot sell or give it away independent of selling or giving away the property. However, if the owner can affect the potential through management of vegetation and soils, the owner can contractually promise to manage the property in ways to increase the potential.

B. The potential does not exist as a separate property right as such, however the owner of a property can grant a covenant affecting the potential. Unlike a contractual obligation, the covenant would “run with the land,” binding the present owner and anyone who happened to become an owner of the property in the future.

1. The covenant attaches to another property related to the first property. The owner of the dominant property then would have the right to protect or perhaps enhance the potential of the subservient property. The covenant can only be transferred with the dominant property.

2. The covenant attaches to a person (an individual, corporation, or government entity). It cannot be transferred.

C. Instead of a covenant, the right is in the form of an easement or servitude. This may attach to a dominant estate or it may attach to a person, in which case it can be transferred to another person independently of any transfer of underlying land.

D. The potential is a separate, alienable property right, such as a usufructuary right or *profit à prendre*, governed under the laws concerning ownership of land (real property, immovable property, etc.). The owner can convey that right to others without conveying the whole property ownership. When that potential is transferred to a new owner —

1. The new owner of the potential inherently has the right to affect how the property is used, if that is necessary to —

- a. protect the existing potential of the property;
- b. protect or enhance the existing potential of the property.

2. The new owner of the potential has no inherent right to affect how the property is used, however the property owner can separately grant the potential owner that right —

- a. through a contract or other legal mechanism that binds the current owner;
- b. through a covenant or other legal mechanism that “runs with the land” and binds the present and any future property owner.

E. As in (D) above, but the right is governed under the laws concerning personal, moveable, or some other class of property that does not include land.

II. The potential is a public good —

A. Owned and ownable by no one. It is like sunshine or air. Many people may take advantage of it, particularly as it improves their own land and condition of life, but no one can claim to own it, buy or sell it, or take credit for the good it does for others.

B. Owned by the national government —

1. As a passive entity that can take credit for carbon sequestration but that has no particular power to require land owners to protect or enhance sequestration, and —
 - a. that holds the potential in trust for the nation and cannot sell or give it away;
 - b. that can sell or give the potential away.
2. As in (1) above, but the national government has inherent power to regulate the use of land to protect or enhance carbon sequestration. This regulatory power is inalienable.
3. As in (1) above, but the national government holds power, as the owner of a property right, to affect property use to protect or enhance sequestration. If, as in (1)(b), the government may transfer the property right, the new owner would also acquire the right to affect property use.
4. As in (1)(b) above, but the national government holds the potential as trustee for the benefit of the forest owner or the public. Any profits from the sale or use of the potential must go to the beneficiaries of the trust.

C. Owned by a sub-national or local government with powers as in (B) above. Note that it might be possible to have ownership vested in one level of government with some or all regulatory powers vested in another level of government.

D. Owned by no one until someone takes steps to capture the carbon. For example, if Corporation A funds a project to plant trees along roadsides, Corporation A would own the resulting carbon sequestration, regardless of who owns the roadside lands. Further —

1. Anyone can acquire carbon sequestration potential in this way.
2. Only a limited number of entities are eligible to own carbon potential in this way and these are —
 - a. entities emitting carbon and desiring offsets;
 - b. (a) plus the government;
 - c. (a) or (b) plus “banks” chartered to deal in mitigation credits;
 - d. (a) or (b) or (c) plus NGOs interested in environmental protection;
 - e. (a) or (b) or (c) or (d) or any landowner.

Some of these options may seem odd, but some of the oddest have analogues in other laws. From the United States come these examples:

⇒ Under the Pacific Northwest Power Planning and Conservation Act, electric power utilities in the northwestern United States can acquire ownership of conservation capacity, informally called “negawatts” (negative watts) by financing projects that reduce electric demand. For example, a utility could pay to install thicker insulation on the tanks of electric water heaters of consumers. The consumers would own the new insulation and enjoy lower electric bills, however the utility would own the reduced

electric demand. The utility can sell this reduced demand to the government agency responsible for assuring that the region has sufficient energy to meet demand.

⇒ Under the US Clean Air Act, in regions that have not attained national goals for air quality, new sources of air pollution must arrange offsets. If the pollution problem in the region is severe enough, the new source must arrange an offset greater than the new source's expected emissions. The exact size of the offset is determined by the new source's expected output multiplied by a factor reflecting the severity of the local pollution problem. In areas with moderate problems, the offset may be close to one for one. In areas with severe problems, the offset may be more like two for one. The offset is not a separate property interest, but more a contractual arrangement between the new polluter and an existing polluter. As an added guarantee of performance, the government alters the air pollution permits of the two sources to reflect the agreed-upon offset.

⇒ Also under the US Clean Air Act, the largest sources of sulphur dioxide in the nation have been assigned emission allowances. A source may only emit as much sulphur dioxide as it has allowances. A source with too few allowances must either reduce its emissions or acquire more allowances. These allowances are alienable, and there is an open market in them. Some environmental groups have bought them and "retired" them.

⇒ Under the US Clean Water Act, persons dredging or filling wetlands need a permit. As a condition of the permit, the government often requires the applicant to arrange mitigation of any damage done to the wetlands. A typical mitigation requirement might be to restore an area of degraded wetlands. In some areas, the government operates mitigation banks (US Army Corps of Engineers et al., 1995). People who restore wetlands create a credit that they can place in the bank. Later, a person in need of a mitigation project can buy the banked mitigation.

⇒ Most US states allow private landowners to grant or sell conservation easements. The holder of a conservation easement can prevent development of the subservient land. Sometimes the holder can require the land be kept in a natural state. Sometimes the terms of the easement require the land to be actively managed for conservation purposes. The holder of the easement ordinarily cannot sell it or reap any monetary gain from it, but holds it strictly to benefit the public. Usually, the law only allows the state or NGOs dedicated to conservation to acquire conservation easements.

⇒ A few US local governments recognize a fully tradable right to develop land. Property owners in areas marked for conservation cannot use their rights to develop their own property, but they can sell the rights to property owners in areas marked for development. Owners that buy the rights can "overdevelop" or build more extensively than neighbours who have not bought the tradable rights. The intent of the system is to fairly compensate property owners in the conservation zone for the restrictions on their property use.

The point of these examples is that the universe of possible models for carbon sequestration ownership and trading goes well beyond traditional notions of property and markets.

Legislative drafters looking for models may find them in traditional systems of property law or in innovative systems of mitigation, trading, and offsets of environmental harm.

The choice of how to shape the nature of the property right in carbon sequestration will depend on several factors. Existing laws and legal traditions will play a major role and may constrain the choice. Legislators and jurists usually prefer to apply existing patterns of law to new situations rather than to adopt radical innovations.

For example, in a country that only recognizes easements or servitudes that directly benefit other properties, legislators may hesitate to recognize a servitude that can be traded independently of a dominant estate. Costa Rica offers a concrete example of this. The country has wanted to create a property interest in the nature of a conservation easement that would create a legal right to prevent the subservient land from being developed or cleared. However, Costa Rican law only recognizes easements that benefit a specific, dominant estate. The country has adopted the minor fiction that a conservation easement is for the benefit of (and so attaches to) nearby reserved natural areas.

Another factor is the nature of the local economy. In a country with unstable currency or poorly developed markets, it will be impractical to set up a national system based on tradable rights. However, a limited system granting credits to large polluters that finance mitigation projects may be feasible.

A third factor is the governmental capacity to deal with abstract forms of land ownership. In a country where the government finds it difficult even to determine who owns surface rights to a particular piece of land, it would be unrealistic to put in place a complex system of intangible, divisible interests.

A fourth factor is the nature of the demand for carbon sequestration. If the major object of a country is to encourage foreign governments to invest in forest-based mitigation projects, and government-to-government dealings are the desired outcome, a system vesting ownership of sequestration in the national government may be appropriate. If developed countries adopt laws that encourage individual emitters of GHG to seek offsets, developing countries seeking private investment may wish to vest ownership of sequestration potential in private hands.

The ultimate interpretation of the Kyoto Protocol may affect the choice and desirability of market mechanisms as well. If the parties develop a system that promotes transfer of mitigation credits, it will make market systems more attractive.

(2) Size

How big is the carbon sequestration potential of a forest stand? In some circumstances, this may be a purely technical question, open to an informed, scientific answer, perhaps with some uncertainty attached, or perhaps based on some specific assumptions. But in the realm of regulation or commerce, these uncertainties and assumptions give the question legal overtones.

For example, we may have competing scientific models for predicting carbon sequestration, just as we have competing models for forecasting complex natural phenomena like fishery

stock size or weather. Further, ongoing research will probably lead to the creation of improved models. So, if we need to establish today the carbon sequestration potential of a forest stand over the next twenty years, what model do we use?

The answer may depend upon the legal circumstances that raise the question. Here are some examples of ways that law and circumstances might affect the determination of the carbon sequestration potential.

A coal-burning utility negotiates with a private forest landowner for the purchase of the carbon sink potential of the forest for the utility to claim as an offset of its emissions.

1. The contract does not discuss the size of the potential, however the size is important to the utility in its relations with government regulators. The size is evaluated by —

A. A specific, objective formula, established by legislation, allowing little room for professional judgement.

B. A set of general guidelines, established by legislation, allowing room for professional judgement of government officials.

C. A set procedure, established by legislation, such as a hearing, allowing interested parties to provide expert testimony to a government official, who makes a decision based on the testimony.

D. Any of the first three options above, except the formula, guidelines, or procedure are set case-by-case by mutual agreement of the affected parties rather than by general legislation.

E. Any of the above three, except the formula, guidelines, or procedure are set case-by-case unilaterally by the government.

F. Any of the above three, except the formula, guidelines, or procedure are set by some third party. This might be a standard-setting organization like ISO or its national affiliates, an impartial arbitrator agreed to by the parties, or by a group affiliated with the secretariat of the FCCC.

2. The contract has terms that depend on the size of the carbon sequestration potential, and the size is set by —

A. A method specified in the contract, chosen by the parties.

B. A method specified in legislation, regardless of what the parties state in the contract.

C. A method specified in legislation unless the parties specifically agree to another method in the contract.

D. By law, the customary method or the method in common use in the trade, unless the contract specifies another method.

Creating workable law in this area may require familiarity with national laws concerning interpretation of contracts, regulation of utilities, and control of air pollution. It may require some familiarity with applicable international standards. It may also require technical understanding of carbon sequestration issues.

Cathcart (2000) describes how the state of Oregon, USA, has decided to determine the size of carbon offsets created by its Forest Resource Trust projects. The state is limiting the total claimable offset to the expected long-term average of carbon stored on the site over multiple harvest and regeneration cycles. The state subtracts from this amount an estimate of carbon stored on the site before reforestation to get the long-term net average increase in carbon storage. This choice appears to be a policy decision that the government has made unilaterally, without formal legislation.

(3) Transfer

The above discussions have begun to raise some of the legal issues that might arise regarding transfers of ownership of a forest's carbon sequestration potential. Assuming that the potential can be owned and transferred at all —

1. Can it be transferred separately from the ownership of the land?
2. If landowner *A* transfers the ownership of the potential to buyer *B* —
 - A. Can *B* force *A* to manage the forest to maintain or enhance the potential?
 - B. Can *B* enter the land and assess the potential?
 - C. Can *B* enter and actively manage the land?
 - D. If *A* then sells the underlying land to new owner *C*, does *C* bear any obligations towards *B*?
 - E. Can *B* transfer the ownership and all it entails to a stranger, *D*?
3. Can the government force *A* to transfer the potential to the government for public use?

These kinds of questions are common ones in the world of property transactions. The answers will depend on whether the government recognizes the potential as a kind of property, subject to property transaction laws, or as something that results from particular kinds of behaviour, subject to laws regarding contracts.

If the potential is transferable, some issues of fraud prevention may arise. The interest will be intangible. There may be no physical indication that someone other than the land occupier holds the interest, beyond the paper or electronic record of transfer held by the parties. What would prevent an unscrupulous owner from selling the same carbon sink potential over and over to different parties?

Governments face similar problems with other incorporeal property rights, such as security interests or usufructuary rights. The spectre of fraud even haunts transfer of the ownership of the whole property.

The response of government has been to give notice to potential buyers of who actually owns the property. In its most basic form the notice may be little more than a public ceremony of transfer or a posted sign declaring ownership. Or, the government may record property interests in a central location and require buyers or sellers to enter sales in public record books.

In nations with well-developed markets and experienced regulators, the governments may wish to consider legislation in other areas to promote transfers. These areas could include insurance, brokerage, banking, and formal market structures.

Insurance encourages transfers by spreading risk. Buyers of carbon sink potential will face two kinds of risk. The first is that the seller does not actually have authority to transfer the sink potential. This could be so because the seller's underlying land title is flawed or because the seller has already transferred the potential to someone else. A "title" insurer would research the seller's ownership rights and issue a policy that would pay out if the seller's title later proved flawed.

The second kind of risk is that the forest does not serve as a sink due to circumstances beyond control of the buyer or seller. For example, flood, wind, fire, insects, or disease could strike the forest. Squatters could steal the trees or clear the land. War or rebellion could destroy the forest. Or the government could acquire the land legally for public purposes such as construction of a road. Insurers might be willing to write policies covering some of these kinds of risks.

Governments may choose to provide insurance directly or to regulate private insurance providers. Providing insurance would be a form of subsidy to promote these kinds of transactions.

Governments may regulate insurers to provide stability to the insurance market and to prevent fraud, thereby making insurance a more attractive option for consumers. Governments interested in promoting sink insurance through regulation probably can draw on their own experience in regulating insurance companies. If the government does not have a domestic insurance industry already, it is unlikely to generate one solely to cover GHG mitigation transactions.

An open market in GHG mitigation potential may allow people to earn money as mitigation brokers. The broker's role would be to link interested buyer with interested seller and to otherwise facilitate sales. (Note that the World Bank has a prototype project to demonstrate the feasibility of GHG mitigation brokerage.) Again, the government may wish to take the brokerage task on itself or it may wish to regulate the profession of broker. Regulation may take the form of licensing, training, or bonding requirements. Governments probably will find models for brokerage programmes and laws in their laws concerning sales of agricultural crops.

Related to brokerage is banking. Here, willing sellers could transfer the rights to their potential to a mitigation bank. The bank would be a central place for those in need of mitigation to come to buy credits. Depending on the system, the bank could pay the sellers for the mitigation up front or could act more like a broker, making some of the payment contingent on sale. Banks could be government or private entities. If the government allows private banks, it may want to regulate them to reduce fraud or mismanagement that could hurt buyers and sellers.

Mitigation banks can function even if the law does not recognize greenhouse gas mitigation potential as a severable, transferable property right. The wetlands mitigation banks found under the United States Clean Water Act are an example. Regulators under that law can require persons seeking to dredge or fill wetlands to arrange for restoration of other wetlands in mitigation. In some states and regions, the government agencies run mitigation banks to link owners of restored or restorable wetlands with people seeking mitigation credits.

Another area that may invite government involvement is in general regulation of markets, if mitigation is openly traded. Nations may wish to control trading through centralized markets, similar to stock, bond, or commodity futures markets.

(4) Risk

The above discussion of insurance touched on the issue of risk. Transactions involving forest sink potential will usually involve ongoing or future offsets. That is, the offset provider will be offering future carbon removal to a person seeking to offset anticipated emissions.

In the case of growing forests, several things could change the forest and so affect that removal. Those things include changes in law or policy that preclude the project (sovereign risk); intentional or unintentional failure of the project promoter to carry out promised actions (implementation risk); and acts of nature or third parties changing the forest (human and natural hazards).

Also, improvements in our knowledge of forest science could change our understanding of how much carbon a particular forest sequesters. If that happens, whether the estimate of carbon sequestered goes up or down, who gains or loses?

Who bears the risk may depend on the nature of the property right and the transaction. In a country where all carbon sequestration potential is owned by the nation, and there are no transactions, the nation will naturally bear all risks. In a situation where a private forest owner contracts with a private factory to provide an offset, the terms of the contract may spell out who bears the risks.

Even in a contractual situation, there may be room for the law to establish basic assumptions on risk. For example, the law may establish who bears the risk when the contract is silent on the issue. This may be a matter of existing contract law, however some nations may eventually establish specific standards covering GHG mitigation transactions.

In countries that adopt regulatory provisions concerning offsets, the situation may be more complex. Those laws may recognize obligations between source and government, source and

sink, and sink and government. A failure by the sink could affect all three obligations, and the law may treat the outcome differently in each case. For example, a nation's law might require sources to contract with sinks for offsets before a source may operate, and it might require contracting sinks to take reasonable precautions to protect the forest to qualify as sinks. If a lightning strike causes sink owner *A*'s forest to burn, does *A* have to return offset payments to factory owner *B*? Does factory owner *B* lose permission to operate? Does *A* owe the government any penalty for the loss of the sink or the increased emissions of carbon from the fire?

The law could require forest landowners or brokers to reduce risks by holding reserves. For example, the law might require brokers to retain carbon-offset rights to one or two hectares of land for every ten they sell. If fire or disease strike, the broker could cover the loss through the reserve. Using similar reasoning, the law could initially require a source to obtain more than a 100% offset for its emissions. If the offset partially failed, the law would not penalize the source unless the offset dropped below 100%.

There may also be a role for insurance systems, set up either privately or through the government. The insurer would collect premiums from those investing in forest offsets. The insurer would use some or all of the premiums to pay for a reserve of unused offsets. If an insured investor experience a failure, the reserve would cover the loss.

The law may want to draw distinctions based on intent or culpability. One rule may state who bears the risk of acts of nature, while another states who bears the risk of loss from negligence or intentional acts. The law may recognize degrees of negligence or may apportion responsibility where multiple causes contribute to the loss.

These kinds of issues should be familiar to contract and regulatory lawyers. GHG offsets may raise issues that are analogous to ones raised in other contractual and regulatory situations.

(5) Liability and Damages

If the owner of a forest suffers damage to the value of the forest due to the actions of another, the law often will offer some way for the forest owner to recover for the loss. This may involve bringing a suit before the courts seeking damages.

The courts may base the amount of the damages on the lost market value of the wood or other commodity taken or destroyed. If carbon sequestration becomes a commodity, the law may automatically include injury to carbon sequestration in damage calculations. However, legislation could give the courts some guidance in this area.

If the nation intends carbon sequestration potential to be a privately owned commodity, the legislature may wish to make a small change to the law governing damage suits to make it clear that damages are available for loss of carbon sequestration. The law could also spell out how the courts should assess the amount of damages. Damages could be based on the commercial value of the sequestration or could be based on the cost of restoring the injured property through reforestation and subsequent management.

If the nation expects carbon sequestration to remain a public good, the law might clearly empower the government to sue to seek damages. Such damages might be based on the cost of restoration. Alternatively, the law could specify some simple formula for calculating damages based on the acreage of forest injured or the volume of wood injured or lost. Such a formula could simplify proof of losses.

One model for such a damage scheme is the natural resource damage provision in the U.S. law governing liability for releases of hazardous substances. Where such a release kills fish or wildlife or injures other public natural resources, the law recognizes the right of the national and subnational governments to seek compensation from those responsible (Comprehensive Environmental Response, Compensation and Liability Act [CERCLA] sec. 107(f)(1), codified as 42 USC sec. 9607 (f)). The law allows the president and state governors to designate government officials to serve as trustees of the resources for the purposes of seeking compensation. The law also empowers the president to write regulations establishing the proper level of compensation for lost resources (CERCLA sec. 301(c), codified as 42 USC sec. 9651(c)).

Even if carbon sequestration potential becomes a privately traded commodity, there will still be a public interest in encouraging that trade. The government may find that valuing damages at the level of lost sequestration potential is not enough to deter injury to forests. If so, the government may wish to consider two ways of increasing deterrence.

One is to make destruction of carbon sequestration an offence. Particularly in countries where the average person lacks the capital to pursue a lawsuit or pay damages, a criminal approach may be the most effective way to deter injuries. Of course, existing laws concerning criminal trespass or damage to government or private property may be sufficient to create deterrence. However, it may be appropriate to direct the courts to consider loss of carbon sequestration value when weighing the severity of the offence.

Another approach is to allow the courts to award double or triple damages for intentional acts destroying carbon sequestration potential or preventing restoration. The possibility of large damage assessments may discourage people from setting fires, clearing land, or occupying cleared land.

From a drafting viewpoint, the most difficult aspect of such laws may be establishing simple and fair ways to value the lost carbon sequestration potential, particularly if it is not a market commodity.

B. Regulatory Issues

There is a recognized role for regulation to protect public interests and prevent environmental harm. Some countries may wish to use their regulatory authority to promote carbon sequestration in forests.

Regulating Forest Use

If effectively implemented, some of kinds of forest regulatory laws could lead to an increase in carbon sequestration. Under some scenarios and readings of the FCCC, a national government might be able to claim those increases as offsets, either crediting them against other emissions in the country or making them available as offsets to other nations.

Examples of possible forest regulatory approaches include —

- Laws placing trees off-limits to harvest. These could include laws creating protected natural areas on private lands, laws requiring uncut buffers of forests around waterways or roads, or laws prohibiting harvest on steep slopes or unstable soils.
- Laws controlling harvest methods or rotation age. Biologists, foresters, and policymakers currently do not all agree on which management techniques or rotation ages would maximize carbon sequestration on particular forests. The issue is made more complex because how long carbon in harvested wood remains out of the atmosphere depends on how the wood is used. If science is able to give clearer guidance in this area, laws regulating harvests may be useful in promoting carbon sequestration.
- Laws requiring property owners to replant harvested or degraded forests.
- Laws limiting the use of fire to destroy logging waste or to clear land, and laws requiring people who work in or use forests to report fires or carry simple fire fighting tools.
- Laws restricting the conversion of forest land to other uses.

Regulating Forest Product Manufacture or Use

Besides regulating the forest landowner, regulation can also aim to slow the return to the atmosphere of carbon in harvested wood. For example —

- Laws could restrict the disposal by burning or careless disposal of sawdust and wood waste.
- Laws could require waste reduction planning in larger, more sophisticated saw, pulp, and paper mills, including steps to discourage decay of stored chips or timber.
- Building codes could require fire-retardant design of large wooden structures.
- Laws could require government offices or businesses to use paper with high recycled content and to collect and recycle office paper.

General Regulation of GHG Emissions

Governments could also use regulation outside the forest sector to aid the forest sector indirectly. For example —

- Laws could require existing industrial users of fossil fuels to arrange GHG offsets in forests or other sinks.
- Laws could require offsets as a condition of siting large new GHG-emitting facilities.

- Laws could require consideration of GHG emissions and mitigation in the environmental impact assessment process.

These sorts of regulations could also promote mitigation projects in agriculture, range management, and other areas beyond the forestry sector.

C. Subsidy and Tax Issues

Because GHG mitigation is a public good, governments may find it appropriate for the public to share the cost of producing it. Subsidies for forest-based GHG mitigation may not be much different from subsidies for forest management generally. GHG mitigation may be harder to evaluate than, say, area of forest cover or volume of wood brought to mills. But the basic mechanisms for promoting GHG mitigation through subsidies are probably analogous to general use of subsidies to promote good forest management. For example:

- As in Costa Rica, the government may wish to pay forest landowners directly for management that promotes carbon sequestration. These could be cash payments, tax deductions, or tax credits.
- Governments could make payments to forest landowners in the form of goods. For example, the government could provide nursery stock, fertilizer, or tools.
- Payments could be in the form of services. These could include fire fighting assistance, survey assistance, or management advice.
- In some countries, payments could go to local communities willing to help improve public forests.
- Revised management of public forests could also be effective. This could include placing restrictions on the forest practices that concession holders may employ in their harvests. Any resulting reduction in government income from concessions would be equivalent to public spending for better management.

Some countries may wish to consider government purchase of lands or land interests:

- In some countries, creation or increased protection of natural areas may be effective. For example, Bolivia has attracted donor, NGO, and corporate funding for the Noel Kempff Mercado Climate Action Project, involving hundreds of thousands of hectares in northeastern Bolivia (<http://www.noelkempff.com>). Projects like these can provide non-consumptive uses besides GHG mitigation, such as protection of biodiversity or ecotourism.
- In some countries, the government may not need to acquire a complete interest in land to achieve its ends. For example, if the law recognizes conservation easements or GHG usufructuary rights, the government could acquire those on suitable lands. It may be attractive to do so on a multi-year lease basis, with annual payments. This would give the landowner an incentive to keep the land in good condition during the whole term of the lease. In countries with annual property taxes based on the value of the land, the government could create an additional incentive by lowering the appraised value of the land during the term of the lease. Leasing would also give the landowner and government periodic opportunity to review the appropriate price to be paid for GHG mitigation. The price will likely change as the market for GHG mitigation matures.

Governments may also decide to undertake general forest management service programmes without regard to the management decisions of individual landowners. For example, the government may decide to spend money on new programmes for forest fire prevention and response, for control of destructive forest insects, or for control of forest diseases. These may ultimately result in quantifiable, verifiable increases in GHG sequestration, which the government may be able to claim for itself or offer as an offset.

More intense enforcement of existing forest protection laws may also yield gains. Most countries find it difficult to enforce basic property laws in remote forested areas. Investment in increased surveillance to stop unauthorized land uses might reduce forest degradation enough to have a measurable effect on carbon sequestration.

Particularly in countries that consume large amounts of wood or paper, governments may wish to undertake programmes to promote more efficient use of forest products. These could include programmes to collect and recycle wood and paper.

Note too that the FCCC directs parties to end destructive subsidies. These might include programmes encouraging the clearing of land or the early harvest of trees.

For the country implementing these kinds of subsidies, the major questions may be judging the costs or likely returns. Until countries gain more experience in these areas, new programmes will necessarily entail some uncertainties.

D. Information Issues

One of the barriers to GHG mitigation projects is a lack of information. Providing information to landowners, consumers of forest products, and the general public may encourage GHG mitigation projects.

Education

Landowners may not be aware that GHG mitigation is an issue that involves them. The government can affect landowner management decisions by taking steps like these:

- Informing landowners about economic opportunities that may arise under offset and mitigation programmes.
- Informing landowners about the public service that they can perform through management for carbon sequestration.
- Informing landowners about how to manage forests to improve carbon sequestration.
- Informing landowners about how to measure and verify the results of their management efforts.

Consumers and users of forest products may not be aware of their role in the carbon cycle. The government might consider programmes like these:

- Clearinghouses collecting information on efficient manufacture and use of forest products.
- Labelling programmes or educational campaigns to inform consumers about efficient use and recycling of forest products.
- Evaluation of the GHG impacts of individual large landowners or forest concession holders and public disclosure of those evaluations.

Certification and Verification

Governments may have a role to play in certifying or verifying GHG mitigation efforts. Certification and verification may be directly connected to compliance with the Kyoto Protocol for Annex I nations; they may be an adjunct to national market-based, regulatory, or subsidy laws; or they may someday be important in the marketing of wood products.

Three articles in the Kyoto Protocol mention certification or verification. Article 12 requires CDM emission reductions to be certified. The Protocol directs the Conference of Parties to designate “operational entities” to make these certifications. Article 6 allows Annex I parties to transfer emission reduction units among themselves, but requires such transfers to be subject to future guidelines from the COP on verification. Article 3 of the Protocol allows Annex I parties to claim net changes in GHG emissions due to land-use change and forestry activities, but requires such changes to be verifiable. In each of these cases, the COP will eventually clarify the role of governments in making certifications and verifications.

Governments that set up market-based, regulatory, or subsidy programmes may find it necessary to create internal standards or mechanisms to verify GHG reductions due to forest activities. Some of the sections above have touched on verification issues (e.g., the discussion of size under market-related issues). Similar verification issues may arise in determining compliance with GHG regulations or eligibility for GHG reduction subsidies.

Government involvement in internal certification and verification could take several forms. The government could itself measure and certify GHG offsets. It could provide official guidelines for measuring them. It could license private parties to measure them.

Note too that government certification may occur in varying contexts. It may be strongly tied to government enforcement efforts, as a means to determine whether property owners are following laws designed to reduce GHG emissions. In a non-enforcement context, the purpose of certification may be to assure parties involved in GHG mitigation transactions that the mitigation is real.

If the public grow more aware of the importance of forests as GHG sinks, they may be interested to know whether wood came from forests managed to promote carbon sequestration. Certification of wood products could provide that information. This could be a government function, or it could fall to non-governmental certifying organizations.

IV. Some Concluding Observations for Legislative Drafters

A. What Should be the Role of Legislation in Supporting Use of Forests in GHG Mitigation?

1. The overall role of forests in GHG mitigation is unclear. The FCCC leaves many open questions about the role of co-operative implementation and the role of forests in particular. The COPs have not resolved these questions.
2. This lack of clarity is slowing the development of forest GHG mitigation efforts. Some nations and individuals have begun, but many are watching and waiting.
3. The time to prepare for GHG mitigation projects is short. The Kyoto Protocol compliance period will begin in 2008 if the Protocol is ratified. Nations are supposed to be able to demonstrate progress by 2005. Given the long time it takes to enact legislation, and the time it takes to grow trees or restore forests, projects should be underway now.
4. The time to plan new laws is now. Having a legal foundation now for forest GHG mitigation projects will enable forests to play a positive role in FCCC compliance.

B. What Expertise Might Drafters Need to Succeed in this Area?

1. On the role of forests, the various articles of the FCCC and the Kyoto Protocol are at best ambiguous and at worst contradictory. Drafters need to be familiar with the texts of the documents and the disputes that the parties are working through concerning interpretation and implementation. Drafters need to follow the actions of the COP towards resolving disagreements about the role of forests.
2. Drafters need to critically analyze the legal responses of other nations. The self-serving descriptions of national responses produced by the parties can distract readers from key questions. How much of this response represents true legal innovation? Are these innovations making a difference in people's behaviour? In other words, what's new, and what works?
3. Drafters will need a basic understanding of the technical issues concerning forest mitigation projects. For example, how can carbon sequestration be measured and verified?
4. Drafters need to be familiar with existing forest laws. Much of the legal response will build on existing law. The response may include programmes to protect forests from degradation or land use change, reforestation and afforestation efforts, extension-style outreach, forest inventories, and social forestry.
5. Some of the response may involve new areas, particularly if countries try to set up markets in tradable offsets or create new property interests. Issues may arise concerning insurance, liability, or property transfer. Drafters may want to seek outside assistance when dealing with unfamiliar areas.

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