Climate Change, Sustainable Development, and Ecosystems Committee Newsletter

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MESSAGE FROM THE CHAIRS

Joe Siegel
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As we did last year, the Section of Environment, Energy, and Resources' International Environmental Law Committee and Climate Change, Sustainable Development, and Ecosystems Committee have jointly produced a newsletter focused on the timely and critical issue of climate change. Despite the wide number of conferences and publications devoted to this topic, there is always more to discuss in this rapidly changing field. In this edition, we are focussing on the interrelationship between climate change and ecosystems, both because of the interests and expertise of our sections and because climate change will have major impacts on world ecosystems and sustainable development. For example, the sustainable management of forests and avoidance of deforestation are now seen as a major solution to reducing the global emission of greenhouse gases. We are excited to have four articles from top experts in the climate change and ecosystem fields in this joint issue of our newsletter.

This newsletter's first article, by Kenneth Markowitz, sets the stage by providing a summary of recent developments in climate change law and policy in the international, domestic, and litigation arenas. Next, Katherine Hamilton discusses reduced emissions from avoided deforestation and degradation secured through carbon markets. She provides a background as to the acceptance and workability of land-based credits in both voluntary and regulated carbon trading systems. Richard Blaustein's article also focuses on deforestation, but examines the concept as developed at the international level through negotiations at the United Nations. Finally, Carl Bruch addresses the critical issue of adaptation to climate change, emphasizing the need to reform environmental law so as to best achieve a robust system that can respond.

We hope you find this issue of our newsletter helpful in your understanding of climate change and ecosystems law. If you would like to get involved in our committees' work on these topics, please contact us. We welcome your membership, input, and participation.

RECENT DEVELOPMENTS IN CLIMATE CHANGE LAW AND POLICY

Kenneth J. Markowitz

The majority of the world's leading scientists now agree that human behavior is causing our climate system to change. Governments perceive climate change as one of the greatest threats to national security; businesses across a broad range of sectors recognize the significant risks and opportunities associated with rapidly evolving regulatory environments at the international, national, and local levels. There is cautious optimism that countries will

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In this issue:

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reach agreement on a successor to commitments made under the Kyoto Protocol for the long-term mitigation of greenhouse gas (GHG) emissions and adaptation to the impacts of climate change. In the United States, President Bush recently called for stopping GHG emissions growth by 2025, Congress is developing federal, economy-wide GHG legislation, and regional programs are advancing in the Northeast, Western States, and Upper Midwest.

Lawyers across a wide range of practice areas—litigation, corporate, funds, global projects, tax, trade, intellectual property, and more—will need to understand climate change laws and policies to help clients manage complex risks and seize emerging opportunities.

This article summarizes recent developments in international and domestic climate change law and policy. It includes an overview of selected court proceedings related to climate change and GHG emissions.

International Law and Policy

In December 2007, some 190 countries, parties to the United Nations Framework Convention on Climate Change (UNFCC) met in Bali, Indonesia, to launch a two-year negotiation over a new agreement to succeed the Kyoto Protocol, whose commitments made by 175 nations (but excluding the United States) expire at the end of 2012. Financing mechanisms, technology transfer, and flexibility to meet compliance obligations were central to the contentious, but productive, discussions in Bali.

UNFCC Parties issued the "Bali Action Plan,"—a roadmap to guide negotiations on "measurable, reportable and verifiable" emission reduction commitments from both developed *and* developing countries, while recognizing the "principle of common but differentiated responsibilities and respective capabilities." The Bali Action Plan recognizes that emission reductions in developed countries alone will not protect against the potentially devastating impacts of severe climate change to global security and the global economy. The Action Plan anticipates that

developing countries will agree to "nationally appropriate mitigation actions" if adequately "supported and enabled by technology, financing and capacity-building." The relationship between enabling access to clean technologies for the developing world and protecting the intellectual property rights of technology developers and investors is highly contentious. The debate, driven by the United States and China, is playing out on many fronts beyond the UNFCC climate negotiations, including in the Group of Eight (G8) process, the World Trade Organization Doha round, and other multilateral and bilateral processes.

The Kyoto Protocol introduced three flexibility mechanisms to help Parties meet compliance obligations: emissions trading, the Clean Development Mechanism (CDM), and Joint Implementation (JI). In Bali, the Parties sought to improve administrative procedures of the CDM and enhance compliance and environmental integrity throughout this system, which creates billions of euros worth of carbon offset credits from sustainability projects in developing nations. Parties highlighted the need for "policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries." The concept of "reduced emissions from deforestation and degradation" (REDD) demonstrates a major shift in how the global climate framework could realign economic incentives so that the value of the ecosystem goods and services flowing from an intact forest is greater than the market value of the timber or other economic benefits from deforested land.

The first post-Bali steps occurred during the first week of April 2008 in Bangkok, Thailand. The major news out of the Bangkok meetings was the strong reaction to a Japanese proposal. Japan offered a plan where emissions reduction targets would be set on an industry or sector basis, rather than solely relying on national quotas. Countries in the developing world strenuously opposed the plan, fearing that it could harm opportunities to continue the industrialization process. Do not expect this to be the last that is heard on adopting a sectoral approach, however, as this is likely to become an important argument advanced by G8 countries. China also strengthened an alliance with Brazil and India, and continued to push forward on legal and moral obligations for technology transfer.

As part of its own post-Kyoto planning, the European Commission issued a proposed Directive on Jan. 23, 2008 for its third phase of carbon regulation (2013 to 2020). The Directive includes revisions to the European Union Emissions Trading System (EU-ETS), a market established to provide countries of the EU with economic flexibility to meet their compliance commitments under the Kyoto Protocol. The EU Council and the European Parliament will now debate the proposal in anticipation of approval by early 2009. The Commission's proposal calls for a 20 percent reduction in GHG emissions across the EU, as compared to 1990 levels. That goal will increase to a 30 percent reduction if other industrialized countries (*i.e.*, the United States) agree to an equivalent goal in a post-Kyoto agreement. Major proposed changes to the EU-ETS include: setting one EU-wide emissions cap instead of twenty-seven national caps, harmonizing the rules governing free allocation of emissions allowances, and including new industries (e.g., aviation, aluminum and ammonia producers). In addition, the proposal mandates new requirements and provides incentives for the use of renewable energy, while prohibiting use of offset credits from forest and land use projects in the trading system.

Domestic Law and Policy

In the United States, both the White House and Congressional leaders have been active in seeking ways to reduce carbon emissions while minimizing the impacts to our economy. President Bush spoke on April 16, 2008, outlining a new national goal of stopping the growth of U.S. GHG emissions by 2025. The goal will be accomplished by encouraging technological innovation with "long-lasting" "technology-neutral" and "carbon-weighted" incentives, which will encourage development of the most promising low-emissions energy technologies. President Bush also spoke about the importance of not leaving "[d]ecisions with such far-reaching impact . . . to unelected regulators and judges." Instead, they "should be debated openly and made by the elected

representatives" in Congress.
The president's comments indicate that the administration does not intend to pursue GHG emissions regulations through the Environmental Protection Agency (EPA). EPA regulations were widely expected after the Supreme Court decision in *Massachusetts v. EPA* ordering EPA to determine whether GHG emissions from vehicles endanger public health and welfare. If an endangerment finding is made, EPA would be required to regulate vehicle emissions. EPA recently issued notice of its intent to publish an Advanced Notice of Proposed Rulemaking (ANPR) for regulating GHG emissions from vehicles. An ANPR is a way for the administration to gather comments on the subject, but does not evince any intent to promulgate rules at this time. As a result, it appears that we can expect Congress to play the most significant role in shaping the national response to climate change.

The leading bill in the Senate, the Lieberman-Warner Climate Security Act, which would create a federal cap and trade program for carbon emissions, passed out of the Senate Environment and Public Works Committee in early December 2007. The full Senate plans to debate the bill in the early summer of 2008. Cost containment, economic impacts and competitiveness, treatment of offsets, linkages with foreign markets, and early action credit are among the interesting issues to watch.

In the House, progress has been slower. Rep. Dingell (D-MI), chair of the House Energy and Commerce Committee, is expected to propose a plan in the spring of 2008. In the meantime, his committee is issuing a series of white papers analyzing the effects of economy-wide carbon regulation. One looked at the economic and competitive impacts if the United States takes action to control GHG emissions and rapidly industrializing (*i.e.*, China, India, Brazil, Korea) economies fail to act, concluding this scenario would not reduce global GHG emissions and likely would have serious effects on our economy, manufacturing in particular. Another white paper considered federalism concerns and roles for different levels of government. It concluded that some state efforts to regulate GHG emissions should be preempted by federal programs, aligning it with positions taken recently by the Bush administration. At the same time, the paper recognized that state and local governments and initiatives, such as building codes and land use decisions, play an important role in reducing GHG emissions and fill gaps in a federal cap and trade program.

Despite significant progress, prospects for meaningful economy-wide carbon legislation this year are not all bright. With a current president who has repeated his opposition to cap and trade programs and uncertainties in the economy weighing against quick action on this critical concern, the political posturing should provide for exciting times in Congress as it debates prospective climate change laws. All remaining presidential candidates have pledged support for federal cap and trade legislation.

EPA's decision to deny California's request to set its own auto emissions regulations has also captured significant attention. EPA concluded that the state did not meet the Clean Air Act's (CAA's) "compelling and extraordinary effects" test, given that climate change is a global problem and the effects are not unique to California. Under the CAA, states may not regulate emissions from new automobiles. California, however, has a special exemption allowing it to apply for a waiver. If approved, other states may choose between the federal standard and the California standard. California and several other states immediately sued EPA for denying the waiver, arguing that the decision was arbitrary and capricious, and several members of Congress introduced legislation to immediately grant California's waiver application. These matters were both pending as of the date of this article.

Other issues getting significant attention include EPA's consideration of life cycle analysis methodology related to biofuels and corresponding provisions in the Energy Act of 2007, the Federal Trade Commission's decision to consider carbon offsets and green marketing in the context of consumer protection, and the emergence of regional and state leadership in the design and implementation of carbon legislation, such as the Regional Greenhouse Gas Initiative, which begins Jan. 1, 2009, with allowance auctions in the Fall of 2008, and California's implementation of its climate change framework law, AB 32.

Several other agencies have also begun to look at various aspects of the climate change debate. The Federal Trade Commission (FTC), for example, held a workshop in January 2008 that examined the growth in the markets for carbon offset products and renewable energy certificates. A lack of transparency and accountability in these products brought the FTC's attention, as doubts are being raised about the validity of many "green" claims. The FTC recently closed a public comment period on whether to update its "Green Guides" to address the carbon markets and other "green" claims related to climate change. The Securities and Exchange Commission (SEC), meanwhile, received a petition in January from a group of institutional investors concerned over corporate disclosure requirements. The petition demanded that public companies be required to identify and quantify the impacts of climate change on their business. This would include disclosure of physical, financial, and legal risks derived from climate change. It is not known at this time whether the SEC will issue any new disclosure mandates.

Litigation

U.S. courts, both federal and state, have been extremely busy with challenges to GHG legislation, consideration of climate change in permitting decisions, and alleged damages resulting from the impacts of climate change.

For example, a very important case is currently pending before the Ninth Circuit, relating to the Corporate Average Fuel Economy (CAFE) standards for light trucks, model years 2008 to 2011. The Center for Biological Diversity (CBD) sued the National Highway Traffic Safety Administration (NHTSA) claiming that the CAFE standards were arbitrary and capricious because the agency failed to monetize the value of the reduction in GHG emissions from alternative standards that would increase fuel economy. In November 2007, a three-judge panel of the Ninth Circuit agreed with the plaintiffs and ordered the agency to prepare an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) that accounts for the effect of auto emissions on climate change (*CBD v. NHTSA*, 508 F.3d 508). NHTSA filed for a rehearing *en banc* in February 2008.

Climate change has also become a major driver of litigation involving permitting decisions. Challenges have been brought against a number of permit applications for coal-fired power plants under the CAA and state laws. A prominent case is in Kansas, where the Sunflower Electric Corporation has been attempting to expand a facility. The Kansas Department of Health and Environment denied an air quality permit request on the grounds that the emissions would contribute to global warming. The Kansas Senate passed a bill to overturn the permit denial, but Gov. Sebelius vetoed the bill in March 2008. Other power plant challenges at the administrative level revolve around the requirement that certain facilities subject to the CAA's Prevention of Significant Deterioration program install the Best Available Control Technology for pollutants that are "subject to regulation" under the CAA—the issue being whether carbon dioxide emissions are in fact "subject to regulation." under the act. The Deseret Power Cooperative (PSD 07-03) case in Utah is currently under review by the EPA's Environmental Appeals Board, with EPA continuing to argue that carbon dioxide emissions are not currently subject to regulation under the CAA. A number of states, nongovernmental organizations, and industry groups have filed amici briefs in that case, and oral argument is scheduled for late May 2008.

Other plaintiffs have used common law claims to litigate the effects of climate change. Most recently, the Alaska Native coastal village of Kivalina filed a compliant in federal court against five oil companies, fourteen electric utilities, and the country's largest coal company for their alleged contribution to climate change. The suit contends that "[g]lobal warming is destroying Kivalina and the village thus must be relocated soon or be abandoned and cease to exist" as a result of the loss of arctic sea ice that protects the village from storms. The suit alleges that global warming is a public nuisance and accuses the defendants of engaging in a conspiracy by using "front groups, fake citizens organizations, and bogus scientific bodies" to create a "false scientific debate . . . in order

to deceive the public" that was "intended to further the defendants' abilities to contribute to global warming" by emitting unlimited amounts of GHGs. This suit is particularly noteworthy for two reasons: (1) the plaintiffs alleged that they have suffered discrete harms from warming that the general public does not share and (2) their lawyers, who are well known from previous lawsuits waged against the tobacco industry for denying the harmful effects of smoking cigarettes, are seeking to make a similar case of conspiracy against the industry defendants.

A number of cases have also been filed against emitting sources alleging common law nuisance. Connecticut and other plaintiffs filed a suit against major electrical utilities claiming that GHG emissions from power plants constitute a public nuisance by contributing to climate change. *Connecticut v. American Electric Power* (406 F. Supp. 2d 265 (S.D.N.Y. 2005)). The district court dismissed the case after the judge ruled that the issues were subject to the political question doctrine—i.e., courts should not adjudicate this type of dispute. The plaintiffs appealed; oral arguments were heard in 2006, and almost two years later the case is still pending before the Second Circuit, suggesting perhaps that the court is struggling with its decision. A California district court dismissed a similar case, *California v. General Motors Corp.* (2007 U.S. Dist. LEXIS 68547), against the six largest auto makers, in September 2007, also citing the political question doctrine in its dismissal. A third case, in Mississippi, was filed by property owners who had suffered damage in Hurricane Katrina. They argued that a group of chemical, oil, and coal companies were responsible for the damages by virtue of contributing to climate change. The district court dismissed the case, which was appealed to the Fifth Circuit, where it currently sits. *Comer v. Murphy Oil* (CV 05-0436, (S.D. Miss. 2007)).

Conclusion

Climate change is no longer just a debate with industry on one side and environmentalists on the other. Today, dealing with the effects of climate change is central to the practices of many attorneys. The issues being raised on the international, domestic, and litigation fronts touch a diverse array of practice areas for lawyers representing the business community. As the federal government and the international community ponder new regulatory programs aimed at reducing GHG emissions, practitioners must stay abreast of the rapid developments to provide the best service to clients facing new risks and opportunities from climate change.

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ABA SECTION OF ENVIRONMENT, ENERGY, AND RESOURCES

Calendar of Section Events

Global Warming II: How the Law Can Best Address Climate Change (36th National Spring Conference on the Environment)
June 6, 2008
Baltimore, Maryland
(Cosponsored with the ABA Standing Committee on Environmental Law)

ABA Annual Meeting
Aug. 7-12, 2008
New York, New York

16th Section Fall Meeting
Sept. 17-20, 2008
Phoenix, Arizona

For more information, see the Section Web site at www.abanet.org/environ/.

REDD TAKING ROOT IN THE VOLUNTARY CARBON MARKETS

Katherine Hamilton

One of the world's first carbon offset deals was brokered in 1989, years before the United Nations Framework Convention on Climate Change or the Kyoto Protocol existed, when AES Corp., an American electricity company, invested in additional reforestation of an agro-forestry project in Guatemala managed by the non-profit CARE International. AES reasoned it could offset the greenhouse gas (GHG) emissions from its new co-generation plant in Uncasville, Connecticut, by paying farmers in Guatemala to plant 52 million pine and eucalyptus trees on their land. AES, like other companies since, invested in the project to reduce its "carbon footprint." The deal was purely voluntarily since there existed no legal obligation to purchase offsets and hence it marked the beginning of the voluntary carbon market and the use of carbon finance as a source of funds for tree planting and forest conservation.

In the nearly twenty years since this early carbon offset project, funds from voluntary carbon offset purchases have continued to finance not only reforestation around the world but also large avoided deforestation transactions also referred to as reduced emissions from deforestation and degredation (REDD). However, when the Kyoto-based international regulatory markets were developed, REDD did not become an accepted source of offsets since avoided deforestation was not accepted as a methodology under the Kyoto Protocols' Clean Development Mechanism (CDM).

The Kyoto Protocol, the major driver of regulated markets, requires industrialized countries to reduce their carbon emissions by an average of five percent below 1990 levels by 2012. The Kyoto carbon markets were born out of Kyoto Protocol's so-called *flexibility mechanisms*: Emissions trading, Joint Implementation, and the CDM. The CDM involves the investment by developed countries (which have reduction obligations) in carbon emission reductions projects in developing countries and is the Protocol's primary means of involving developing countries in achieving GHG reductions.

While REDD projects did not become an accepted source of credits under the CDM, reforestation and afforestation did become accepted as methodologies under the category of land use/land use change and forestry ("LULUCF" in Kyoto Parlance). Despite this fact, these project types have faced a range of barriers in these regulated markets. For example, the European Union Emissions Trading Scheme (EU-ETS), which is by far the largest source of demand for carbon offsets in world, does not accept LULUCF credits into the system. Hence, in 2006 less than 1 percent of transactions under the CDM were forest-based. Alternatively, according to an Ecosystem Marketplace and New Carbon Finance report, forest-based projects constituted more than 37 percent of the credits transacted in the over-the-counter voluntary carbon markets. This could change. However, until REDD becomes an accepted methodology under the CDM, many forest owners, investors, and conservationists are looking to the voluntary markets as a source of funds and as an arena in which to incubate new ideas and methodologies.

By definition, the voluntary carbon markets include all carbon offset trades that are not required by a governmental established legal obligation. These trades include: transactions under Chicago Climate Exchange (CCX), a voluntary but legally (contractually) binding U.S.-based cap and trade system; purchases in the rapidly growing retail offset market; institutions purchasing credits directly from project developers for retirement or resale; and corporations donating to GHG reduction projects and receiving credits. Sellers in the market include retailers selling offsets online, conservation organizations hoping to harness the power of carbon finance, and CDM-hopeful project developers with credits that for a range of reasons cannot currently be sold into the regulated market. Because the voluntary market, with the exception of CCX, inherently does not operate under a cap, all carbon credits purchased in the market originate from project-based transactions. Buyers in the market range from multi-national corporations to non- profit organizations to individuals. Buyer motivations include

the desire to manage their climate change impacts, an interest in innovative philanthropy, public relations, the need to prepare for (or deter) GHG regulations, and plans to resell credits at a profit.

Like the regulated carbon markets, the voluntary markets are new, quickly evolving, and complex. Unlike the regulated markets, in general, the voluntary markets function without a regulatory market driver, single standard, or all-inclusive registry. Although a range of voluntary carbon market standards have recently been launched to help clarify the definition of a valid credit, there are still huge variations in definitions of legitimacy. In response to the fact that emerging organizations offer offsets from a variety of sources and project types, the supply chain for carbon offsets is complex, the market fragmented and the product highly abstract, many observers of the voluntary market have described it as the "Wild West."

Compared to the CDM, the voluntary market could be considered the ultimate "flexible mechanism." Although such flexibility has resulted in market pitfalls for both buyers and sellers, it is also the source of numerous market strengths such as potentially reduced transaction costs, lower barriers to entry, and promotion of innovation. Such flexibility has been key for keeping a path open for land conservation-based offsets and has enabled carbon financing to be used for forest protection projects via the voluntary carbon markets.

For example, in 1997, The Nature Conservancy and a Bolivian foundation, Fundación Amigos de la Naturaleza, joined forces to protect 832,000 threatened hectares of tropical forest bordering along the Noel Kempff Mercado National Park in northeastern Bolivia. Financed by investments from American Electric Power Company, BP-Amoco, and PacifiCorp, the preserved land became part of the national park and a pilot project for measuring carbon sequestration via avoided deforestation. In return for their investment, these major energy companies have rights to a percentage of credits generated from the project. The project continues to grow and has become a critical case study for the development of forest carbon methodologies.

The voluntary carbon markets are fertile ground for REDD projects because voluntary buyers often seem to have a higher willingness to pay for "charismatic carbon" with high social and environmental co-benefits. Martha "Pati" Ruiz Corzo describes the credits she is selling to finance reforestation and forest conservation in the Sierra Gorda Biosphere Reserve, an area rich in biodiversity, as "not just a carbon credit, but as a green jewel protected by its inhabitants."

Because voluntary markets, outside of CCX, are not driven by a cap, the drivers of supply and demand are shaped by consumer choice variables that barely exist in the regulated markets. Although CDM projects may have a range of co-benefits, in general credits are commoditized and sold as a generic "Certified Emission Reduction" and compliance buyers are not willing to pay extra for environmental or social co-benefits. In many voluntary transactions, especially in the retail market, the demand curve for offset purchases has as many shared characteristics as the markets for Fair Trade or organic cotton as the EU-ETS trading scheme. The majority of consumers in this market are driven by public relations or ethics and are often willing to pay a premium for 'greener' attributes. Factors contributing to the appeal of a credit include sustainable development and biodiversity co-benefits or measurable land saved. In the realm of offset projects, these co-benefits are a competitive advantage for LULUCF projects. Because of the voluntary markets' link to philanthropic or public relations, the demand for "charismatic carbon" is an important driver in the market. For example, credits certified to a voluntary carbon market standard that includes requirements for social and environmental co-benefits, such as the Gold Standard or the Climate Community and Biodiversity Standard, are selling for a premium in the marketplace.

As well as being charismatic, land-based credits also have the benefit of being a critical, and well-known actor in the carbon cycle. For a business seeking to communicate the benefits of offsets, forestry projects are a simple choice for communicating the concept. Erin Meezan of Interface explained that the company chose forestry credits from major tree planting projects with the non-profit American Forests in California and

the South (two regions where Interface has plants) and the Northeast for offsetting in-house emissions with the goal of "employee education and engagement in our sustainability mission." With this goal in mind, forestry projects became particularly appealing. "Trees is one area of carbon sequestration that everyone understands, even little kids understand… people get it."

The voluntary markets are characterized by their ability to finance projects irrespective of whether they are an accepted project type in the regulated Kyoto markets. However, the voluntary and regulated carbon markets consistently influence each other. And the recent international endorsement at the United Nations' Framework Convention on Climate Change conference in Bali, Indonesia, of REDD as a critical means of mitigating GHG emissions has influenced the demand for REDD credits on the voluntary front.

For example, Carbon Conservation, a company focused on using carbon markets to finance conservation, recently struck a deal with the investment bank Merrill Lynch to invest $9 million over four years in a forest conservation project in Indonesia's Aceh province. "Pre-Bali, no one wanted to touch avoided deforestation," says Dorjee Sun, CEO of Carbon Conservation. "Now people are starting to recognize avoided deforestation as the next big thing, and they are looking for ways to participate with an edge."

In addition to international agreements, developing U.S. state cap and trade systems are already another force contributing to the popularity of REDD credits in the voluntary markets. In March 2008, California's Pacific Gas and Electric Company (PG&E) announced the purchase of 214,000 metric tons of carbon credits certified to California Climate Action Registry (CCAR) forest project protocol. The credits originated from restoration and management of two California forests. PG&E purchased the credits to offset the emissions of the 17,500 PG&E customers who have voluntarily signed up to purchase offsets under the company's ClimateSmart program. Although it is not decided yet whether California legislators will proceed with a cap and trade system to meet climate change legislation (AB 32) goals, the CCAR protocols are expected to be the carbon standards to which such offsets must comply.

Overall the voluntary carbon markets remain only a fraction of the size of the regulated markets. A recent report, *Picking Up Steam: State of the Voluntary Carbon Markets 2007,* estimated the value of the voluntary markets at $93 million, much less than the World Bank's valuation of the regulated markets at over $30 billion. It is clear that these relatively small offset markets cannot be a substitute for regulation. However, those following REDD under Kyoto and in emerging U.S. regulation will see this small but cutting-edge market as fertile ground for the growth and development of carbon finance for land-based conservation.

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REDD GETS OFF THE GROUND

Richard J. Blaustein

A New Look at Avoided Deforestation

REDD is a term that became common in climate change parlance in 2007 and will become more so in the two-year period of negotiations for a successor to—or transition from—the Kyoto Protocol that was launched in Bali at the December 2007 Thirteenth Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). The concept of REDD and more broadly the relationship between deforestation and climate change mitigation indeed has become a major issue in discussions under the UNFCCC/Kyoto process and in other forums. Reflecting its broad and contested subject matter, the acronym "REDD" itself incurs differences as to what it signifies. For example, for some in the deforestation discourse, REDD signifies "Reduction of Emissions from Deforestation and

Forest Degradation," while others refer to REDD as "Reducing Emissions from Deforestation in Developing Countries." Nevertheless, it is clear that REDD first and foremost refers to deforestation, mostly in the tropics, and the maintenance of the integrity of forests and their levels of ecosystem health, biodiversity, and carbon-sequestration functions. What is most significant now is that the avoidance of deforestation (defined by the UNFCCC as the conversion of forest to non-forest), as distinct from re-forestation (replanting of forests on lands that have previously contained forests but that have been put to other use) and afforestation (planting of new forests on lands that historically have not contained forests), for the first time, has been specifically included in negotiations under the UNFCCC and recognized as a significant factor to reduce greenhouse gas (GHG) emissions and climate change. This inclusion is extremely significant for a number of reasons, not the least of which is that deforestation is estimated to result in 20 percent of yearly global emissions of GHGs.

The implications of the Bali Action Plan's inclusion of deforestation and a separate COP decision on reducing emissions from deforestation are substantial, and some climate change activists have expectations for a process enlisting private and governmental investments, rights, and access delineations, in addition to producing substantial mitigation gains. Moreover, many of the possible national, regional, and international efforts at reducing deforestation will require serious inputs from attorneys. These inputs include formulations of legally sound market mechanisms, baseline mitigation accounting, conservation and biodiversity safeguards, and the equity understandings for tenure, ecosystem services, and natural resources access that apply to lands that are the focus of reducing deforestation. Importantly, the deforestation discourse inherently encompasses ecosystems understandings, specifically for forests, and most intensively represents the inevitable linkage of ecosystems policy to climate change mitigation efforts, negotiations, and law.

The History of the Deforestation in the UNFCCC Process

Whereas actions to encourage reforestation and afforestation have been included in the policy focus and incentive mechanisms of the Climate Change Convention and its Kyoto Protocol since 1997, deforestation was not, mainly due to politics, policy, and sovereignty over natural resource issues. Additionally, some environmental advocacy groups viewed a UNFCCC program for avoiding deforestation in developing countries as potentially encouraging developed countries to avoid meaningful domestic commitments.

The recent inclusion of the concept in Bali, however, was not sudden. It followed years of intensive analysis, discussion and disagreement. By late 2007, a very real—albeit somewhat discordant—consensus emerged for including actions to avoid or reduce deforestation in the future international effort to mitigate climate change.

The Thirteenth COP (COP 13) to the UNFCCC linked avoided deforestation with the creation of possible mitigation incentives and gave it a priority that was not included in the earlier UNFCCC COP decisions. In particular, the Marrakesh COP 7 in 2001 and the 2005 Montreal UNFCCC COP 11 (which included the first Meeting of the Parties to the Kyoto Protocol (COP-MOP)) did not include avoided deforestation among the projects eligible under the Clean Development Mechanism (CDM). Specifically, the CDM's specification for Land Use, Land-use Change and Forestry Activities (LULUCF) included afforestation and reforestation but not avoided deforestation.

Nonetheless, the compelling importance of reducing deforestation and forest degradation was not absent from continuous climate change discourse and negotiations. At the 2005 COP-MOP in Montreal, Costa Rica and Papua New Guinea were able to put deforestation on the expected agenda of the Subsidiary Body for Scientific and Technological Advice (SBSTA), one of the "subsidiary bodies" to the UNFCCC process where issues are analyzed and

negotiated before being put before the COP for a decision. Next, at the November 2006 Nairobi Twelfth COP and Second MOP (COP-MOP 2), Parties committed to re-focus on the compelling deforestation issue for conference discussion at the Bali COP 13 in 2007. The Parties further agreed to hold two workshops prior to Bali (one after the COP 11 and one after COP 12) dedicated to deforestation issues. At those workshops, which took place first in Rome (Aug. 30-Sept. 1, 2006) and then in Cairns, Australia (March 2007), the Parties submitted proposals and contributions on the many issues concerning the inclusion of avoided deforestation in the UNFCCC/ Kyoto process.

Bringing the deforestation discussion to Bali was an especially vivid and pertinent move, with the choice of the historically forested and richly biodiverse islands of Indonesia pointedly underscoring the significance of deforestation in current climate change calculations. With some estimates of GHG emissions from deforestation, forest degradation, and peat land conversion placing Indonesia as one of the largest national emitters of GHGs, the months before the Bali conference saw a bustle of activity focusing on reducing deforestation, including conferences, workshops, and preliminary meetings in Indonesia. Very noteworthy also were the refinement of the soon-to-be launched World Bank Forest Carbon Partnership Facility (FCPF) and Australia's launching of its $200 million assistance program, the Global Initiative on Forests and Climate, whose promulgation included a prominent official visit to Indonesia.

Deforestation and the Bali Action Plan

COP 13 in Bali created a broad opening for future work on deforestation and initiated a period of demonstration activities that could significantly increase developing nation capacity to address deforestation. In particular, Bali participants made significant mention of actions to reduce deforestation in the eponymous Bali Action Plan and reached a separate decision on the concept. In the Bali Action Plan, the full COP agreed to "launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia….(iii) Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries."

Significantly, that same mitigation section in the Bali Action Plan calls for consideration of "[v]arious approaches, including opportunities for using markets, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries." (See Bali Action Plan 1(iii) and 1(v)). Although marked by substantial disagreement among different developing nations, market mechanisms are often cited, including by some conservation non-govenrmental organizations, as an effective means to attain the level of funding needed to significantly reduce deforestation, conservatively estimated in the billions of dollars per year. Although a market approach to deforestation will also need to be supplemented by overseas direct assistance and or public international funding, the Bali Action Plan suggests that significant private sector capital, in addition to governmental assistance, will be directed at reducing deforestation.

The Bali COP Decision "Reducing emissions from deforestation in developing countries: approaches to stimulate action" instigates an immediate period of demonstration activities with international funding support and calls for reporting on methodologies and experiences for the upcoming UNFCCC process for review at the next COP. The decision, which affirms "the urgent need to take further meaningful action to reduce emissions from deforestation and forest degradation in developing countries," calls on Parties "to explore a range of actions, identify options and undertake efforts, including demonstration activities, to address the drivers of deforestation relevant to their national circumstances, with a view to reducing emissions from deforestation and forest degradation and thus enhancing forest carbon stocks due to sustainable management of forests." Importantly, the

first group of activities given the UNFCCC imprimatur are considered "demonstration activities" and not pilot projects, and this distinction avoids the committed implications of terming a period "pilot." This point in part reflects the disagreement whether a market mechanism should prominently figure in the financing of deforestation reduction efforts in developing countries.

Even though much will need to be worked out, the launching of an immediate period of demonstration reflects the international community's shift to include avoided deforestation in a future effort and also to immediately begin the process of learning, measuring, and capacity building so that avoided deforestation will have attendant understandings necessary for inclusion in a coordinated effort to mitigate GHGs. This commitment is further reflected in the decision's direction for the SBSTA to "undertake a programme of work on methodological issues related to a range of policy approaches and positive incentives that aim to reduce emissions from deforestation and forest degradation in developing countries." Reflecting the UNFCCC seriousness to get things underway, as part of this SBSTA process, the UNFCCC COP decision invites "Parties to submit, by 21 March 2008, their views on how to address outstanding methodological issues including, inter alia, assessments of changes in forest cover and associated carbon stocks and greenhouse gas emissions, incremental changes due to sustainable management of the forest, demonstration of reductions in emissions from deforestation, including reference emission levels, estimations and demonstration of reduction in emissions from forest degradation, implications of national and sub-national approaches including displacement of emissions…to be compiled into a miscellaneous document for consideration at the Subsidiary Body of Scientific and Technological Advice at its twenty-eighth session."

This opening for ongoing and future efforts has direct bearing for the World Bank's FCPF, which was launched at the Bali Conference. At the launching event, World Bank President Robert Zoellick said, "The Forest Carbon Partnership Facility will set the stage for a much larger system of positive incentives and financing flows in the future to achieve the sustainable use of forest resources and conservation of biodiversity. Carbon finance provides a key new incentive for doing better by conservation and overcoming poverty in the forest sector."

The FCPF scope and structure is clear. It contains two mechanisms. The first is the approximately $100 million Readiness Mechanism, which will assist approximately twenty countries with "infrastructure capacity building" and aid in the development of a national REDD strategy, baseline estimations, and monitoring. The second is the Carbon Finance Mechanism, which will be an approximately $200 million program for fewer countries that will begin demonstration activities (or as the World Bank refers to "pilot activities") for forest projects that reduce emissions from deforestation and forest degradation. Importantly, the FCPF is designed to be irrespective of the Kyoto Protocol and stays clear of a commitment to one or another future design for financing avoided deforestation.

The FCPF received support from developing countries, significant financial support from Europe, a $5 million contribution from The Nature Conservancy, and political support from the United States with the possibility of a future U.S. donation. A major development from the Bali talks, the FCPF significantly aids in beginning the process for actual international support for on-the-ground efforts for avoided deforestation in the developing world.

Implications of the Bali Plan

Given diverging opinions on the most effective and equitable means to support mitigation financially, the UNFCCC discussions on reducing deforestation avoid commitments to one mechanism or another, but do direct an exploration of possibilities and support for ongoing efforts. For example, the COP decision does encourage all Parties "to support capacity-building, provide technical assistance, facilitate the transfer of technology to improve, inter alia, data collection, estimation of emissions from deforestation and forest degradation, monitoring and reporting, and address the institutional needs of developing countries to estimate and reduce emissions from deforestation and forest degradation" and invites "relevant organizations and stakeholders, without prejudice to any future decision

of the Conference of the Parties on reducing emissions from deforestation and forest degradation in developing countries, to support efforts" as mentioned in earlier decision paragraphs.

Importantly, the new UNFCCC focus on avoided deforestation encompasses forest issues that will be new ground for the UNFCCC. These issues, such as safeguarding biodiversity, indigenous and local peoples' rights, and provision of public goods that come from functioning forests, are fundamentally ecosystem-centered and thus highlight the policy linkage of ecosystems and climate change. With the UNFCCC decision mentioning "needs of local and indigenous communities," co-benefits (such as ecosystem services and safeguarded biodiversity levels) and the COP decision's "Indicative guidance" that deforestation "(d)emonstration activities should be consistent with sustainable forest management, noting, inter alia, the relevant provisions of the United Nations Forum on Forests, the United Nations Convention to Combat Desertification and the Convention on Biological Diversity," the new focus on REDD will necessarily elicit inputs to avoid many of the forest contests that have occurred around sites of protected areas and natural resource extraction.

In fact, the UNFCCC lacks a strong provision and discourse history on the equity considerations of setting land aside for forest and ecosystem conservation, and this will surely elevate the input of other fora, such as the Convention on Biological Diversity, that have extensive experience with local and indigenous peoples' rights and equity concerns that attend to forests. This input is promising as collaborative discussions and arrangements of the respective conventions are already underway. Moreover, in all these forest considerations, whether addressing market questions, equity issues, or the distribution of resources and services forests provision, lawyers will play a necessary role in exploring understandings at the international and local levels that will fit into an effective and sustained REDD program.

Bali has thus begun a large enterprise on bringing avoided deforestation into the system of incentives and support for the mitigation of GHG emissions. An enormous amount of work will need to be done on many of the issues attending to forests. However, a significant start occurred with the Bali decision on deforestation, the Bali Action Plan, and the launching of the World Bank FCPF. All of these efforts will have to take into account the safeguarding of healthy ecological functions and the services provided by forests and also attendant equity concerns, in addition to significant financial, transactional, and governmental relationship issues. Notwithstanding these daunting challenges, reducing the estimated 20 percent of global emissions from deforestation is not only compelling but also opportune. Furthermore lawyers have the tools to help ensure that this global effort addresses the transactional, ecosystem, and equity issues of international forest policy, and thus ensuring the success of REDD.

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ADAPTATION LAW AND THE FUTURE OF ENVIRONMENTAL LAW: HOW CLIMATE CHANGE WILL RESHAPE ENVIRONMENTAL GOVERNANCE

Carl Bruch

Climate change is reshaping our world. The four reports of the Intergovernmental Panel on Climate Change (IPCC) set forth a grim future for ecosystems and the people that depend on them. In addition to the threats to human health, the environment, and economy predicted by the IPCC and others, UN Secretary General Ban Kai Moon has expressed concern that climate change could cause wars. As if that were not enough, recent reports suggest that the IPCC underestimated the likely scope and severity of the impacts of climate change.

But this fate is not inevitable. We have turned away from the precipice before, and we can do it again. Predictions of environmental doom in the late 1960s and early 1970s gave birth to environmental law, ushering in the "Environmental Decade." During this time, the United States put in place an unprecedented

body of environmental law, revolutionizing the way the economic development and environmental protection were considered by the government, industry, and the public. At the international level, developing and developed countries have successfully collaborated to address another urgent atmospheric challenge: phasing out ozone depleting substances. This success was possible only through international collaboration, financial and technical assistance, and effective international and domestic legislation that was implemented and enforced. Although more remains to be done—particularly with respect to providing sustainable livelihoods for the world's poor—environmental laws have had dramatic impacts on the environment and public health, as well as how the costs of pollution are internalized and more efficient uses of natural resources are maximized.

Despite its successes, environmental law has failed to address climate change effectively. Until recently, almost no countries had laws addressing climate change. Recently, momentum has been growing to regulate greenhouse gases (GHGs) at the international, national, and local levels, but even if the global community cut its emissions of GHG by 80 percent or more immediately—and such a significant drop could take decades—we would continue to feel the effects of climate change for decades or longer. We must adapt to climate change. There is no choice. And as with previous environmental crises, law will play a central part in guiding, compelling, and sanctioning actions necessary to adapt.

Climate Adaptation and the Governance Imperative

The potential costs of adapting to climate change and its many anticipated impacts are staggering. Even if the international community makes available billions of dollars worldwide for adaptation—for example, through an international Adaptation Fund—that will be only a fraction of the funds that are necessary for adaptation. Adaptation is not just a financial and technical matter. We simply do not have the resources to engineer our way out of the effects of climate change. Adapting to climate change necessarily means changing how we manage water, biodiversity, agriculture, forests, land use planning, and coastal zones. This means revisiting— and likely changing—a vast range of environmental laws and institutions.

Unfortunately, there has been little consideration to date of the role of law in ensuring the capacity of communities and nature to adapt to climate change. What sort of laws do we need? Which laws need to be reformed? How? Where do we need new laws? The plain truth is that we do not know.

The climate crisis demands a new generation of environmental law. This new body of law must address both mitigation and adaptation. Although attention has focused on what type of laws are necessary to cut GHG emissions (mitigation), there has been as yet little effort to improve the laws necessary to ensure effective adaptation to climate change. Indeed, there is little awareness regarding the need to reform environmental laws to adapt to climate change.

This will change. Two years ago, adaptation was functionally a footnote to the global climate discourse. Four IPCC reports and an Oscar-winning movie later, decisionmakers and the general public broadly understand that climate change is happening and that we must adapt. New ways of organizing society are necessary. This means new laws and new governance frameworks. As with the previous environmental crisis, we are in the midst of a paradigm shift. This shift is toward an adaptive society, and we need legal systems that are capable of adapting to the new reality of climate change.

A New Kind of Environmental Law

It is imperative to review existing environmental laws and institutions in light of the anticipated effects of climate change, identify ways that the existing frameworks could be used to adapt to climate change, and update or reform laws and institutions to better cope with the effects of climate change. This reform of environmental law should address four aspects of climate change:

(1) building resilience to anticipated effects;
(2) incorporating adaptive management of the governance system;
(3) providing early warning of emerging threats; and

(4) ensuring effective emergency response to specific incidents.

Building resilience generally includes measures to address other stressors, enabling the resource to better cope with the stresses associated with climate change. In most instances, resilience entails undertaking measures that have already been identified as necessary for the effective and sustainable management of those resources (reducing pollution, addressing illegal hunting, etc.); climate change elevates the importance of implementing and enforcing those measures. Thus, for example, it is possible to build the resilience of fisheries to adapt to climate change by addressing overfishing and improving habitat.

Because of the uncertainties regarding the specific effects of climate change (including, magnitude, timing, and synergies) as well as the effectiveness of legal and institutional responses, it is necessary to enhance the adaptive capacity of the governance system. Incorporating *adaptive management* into laws and institutions can enhance capacity of governance systems and thus ecosystems to adapt to changing climatic conditions, new technologies and techniques, and increased scientific understanding. Often described as "learning by doing," adaptive management is a structured, iterative approach for making decisions in light of uncertainty. In contrast to building resilience—where the legal approaches are generally known and understood, adaptive capacity is new, and there is as yet limited experience in structuring or reforming laws to adapt to climate change.

Early warning includes monitoring and notification regarding potential droughts, floods, heat-waves, and introduction of invasive species. Finally, institutional and legal measures are necessary to provide for *emergency response* to particular challenges—for example, during drought, temporarily reallocating water from one sector to another.

Although there is a fair amount of experience—in developing and implementing laws that enhance resilience, early warning, and emergency response, there is relatively limited experience and familiarity with adaptive management. At the same time, the uncertainties inherent in coping with the potential effects of climate change demand a different approach to managing uncertainty. In particular, there are significant uncertainties about the timing and geographic distribution of primary effects (such as temperature rise, changes in precipitation, and changes in extreme weather events), secondary effects (such as invasive species or wildfires), and the effectiveness of response measures (legal, engineered, management, etc.).

First and foremost, adaptive management demands a different approach to managing uncertainty. Adaptive management acknowledges that decisions are made with imperfect information, and thus are necessarily provisional. Although there are different approaches, adaptive management is generally understood to entail:

- definition of objective(s),
- analysis of options,
- the development and adoption of a *provisional* measure (in this case a law, policy, or institutional arrangement),
- ongoing monitoring and collection of information,
- periodic assessment of the collected information (to determine the effectiveness of the laws and institutions),
- modification of the legal and institutional frameworks as appropriate, and
- continuing the management cycle of monitoring, assessment, and revision.

Many existing environmental laws and institutions already address some of these measures, for example, on monitoring. To be integrated into an overall framework for adaptive management, existing measures could be modified. However, the last step—the introduction of feedback loops—is the most revolutionary. In fact, this has been a significant sticking point for the Environmental Protection Agency (EPA), which has yet to use adaptive management in a meaningful way; for EPA, the primary concern appears to be the difficulty of adopting this management technique which requires flexibility and often quick responses with the more formal and time-consuming notice-and-comment rulemaking requirements under the Administrative Procedure Act.

Notwithstanding the EPA's concerns about adaptive management, other U.S. agencies have a growing body

of experience in managing natural resources adaptively. For example, the Department of the Interior has introduced adaptive management for river basins, federal lands, wildlife, and forests; the U.S. Forest Service has used adaptive management for forests; and the Federal Energy Regulatory Commission has introduced adaptive management into the licensing process for hydropower dams. Australia used adaptive management as a centerpiece of its framework for managing the Murray-Darling River Basin. The Netherlands has introduced adaptive management to address various climate change-related concerns.

There are some concerns that should be addressed in introducing adaptive management. First, regulators, the regulated community, and the public need to develop a different understanding of uncertainty and living with change, particularly if there are to be regular changes to laws and regulations. Second, some environmentalists have expressed concern that the flexibility of adaptive management may allow agencies and regulated entities to delay or avoid taking action. The concern is that if a law establishes an adaptive framework with multiple options for pursuing broad goals, the flexibility and lack of specific standards or hard obligations could hinder enforcement of the law. This could be problematic particularly if an agency seeks to undermine environmental protections without actually changing the law or regulations. Without clear, unambiguous requirements, efforts to challenge an agency action or inaction could be deemed to be within the allowed regulatory flexibility. Moreover, planning documents or mitigation measures (for example, associated with an environmental impact assessment) could broadly assert that an adaptive approach will be followed without providing clear goals, measures, or metrics. These are legitimate concerns, and they can be addressed through providing clear goals and metrics for assessing progress, while providing some flexibility in the precise implementation measures. Moreover, ongoing stakeholder oversight can identify and highlight potential abuses of flexibility.

Toward Adaptation Law

The breadth, severity, and imminence of the effects of climate change compel the development of a new field of law: adaptation law. Adaptation law would comprise both sector-specific applications and cross-cutting considerations.

To a large extent, adaptation law will entail integrating considerations of adaptation to climate change into existing law. For example, environmental impact assessments under the National Environmental Policy Act (NEPA) and state equivalents should consider whether and how climate change might affect the proposed activity and its alternatives: could sea level rise affect the long-term viability of a proposed road or a building in a coastal area? Water use and discharge permits should provide for reopening the terms of the permit in case of, say, prolonged drought. Zoning and land use regulations and plans—particularly in coastal areas and in flood-prone inland areas—should consider whether and how to account for forecasted sea level rise, increased storms, and increased flooding. This may mean the introduction of rolling easements, set-backs, buffer zones, or similar mechanisms. Transferable development rights may be introduced to off-set hardships to landowners and ameliorate concerns of regulatory takings. Particularly in areas prone to climate-induced threats such as flooding or wildfires, property transactions could include a standard advisory note regarding the risks associated with climate change in that particular area, as well as notification of any property-specific history (e.g., past flooding, threats from wildfires, etc.); these generic and property-specific requirements could be modeled on similar notification requirements for lead paint and for radon.

More broadly, takings law will need to be revisited in light of sea level rise. Will coastal land owners be permitted to take any and all measures to protect their land against sea level rise, including what might be termed the "Dutch solution": dikes, levies, and such? Or will there be a more diverse set of decisions to resist, retreat, and accommodate sea leave rise, depending on the particular circumstances? How will we make these decisions, and who will make the decisions? How will we address disparate impacts and distributional effects of climate change?

Building codes for residential, commercial, and industrial buildings, as well as standards for infrastructure, need to adapt to climate change. In

revising these codes and standards, there will be the issue not only of applying them to new construction but also retrofitting existing structures. With the flight of insurance companies from coastal areas, states are facing pressure to insure residents; indeed, the State of Florida is—by law—the primary insurer for numerous houses in southern Florida.

In addition to the built environment, laws and institutions governing natural resources and protected areas will need to adapt to climate change. Wetlands are particularly sensitive to climate change. As witnessed with Hurricane Katrina, extreme weather events such as hurricanes can devastate mangrove swamps, wetlands, and other coastal ecosystems. Sea level rise can inundate wetlands: a one-meter rise in sea level is projected to lead to a loss of 80 percent of the Mekong Delta, and there are similar concerns about the loss of the low-lying Everglades to sea-level rise. Management regimes of extensive inland wetlands, such as the Okavango Delta in Southern Africa and the Pantanal in South America, need to incorporate climate change at the basin, national, and local levels.

Biodiversity is a significant challenge. Over millennia, plants and animals have adapted to specific ecological niches. However, those niches are changing rapidly. Although some species will be able to adapt fairly easily—biologists have documented adaptation by mosquitoes, jellyfish, and bark beetles already—others will have more difficulties adjusting. With their niches changing, many species no longer are ideally suited to their historic ranges. Animals can seek new habitats, if there are sufficient corridors, but it is more difficult for plants to move. With ecosystems stressed by changed temperatures and precipitation, invasive species are a growing threat. But if the ecological niche is changing, what is "invasive" and what is simply a concomitant change in the biological community corresponding to the changes in the niche? Basic assumptions regarding biodiversity management may be fundamentally different in a world threatened by climate change: adaptation increasingly focuses on conserving centers of evolution, not just conserving individual species. Protected area borders may need to be redrawn to account for different ecological conditions.

Water is particularly susceptible to climate change, and laws governing water at the basin, national, state, and local levels will also need to be revised. This includes both surface water and ground water (particularly in coastal areas that may suffer saltwater intrusion). Particular attention should be paid to managing potentially long-term droughts and how to reallocate water among sectors in a fair, effective, and efficient way.

Laws governing resource-intensive industries—including fisheries, forests, agriculture, and others—will likely require modification. These reforms may include legal and institutional frameworks for identifying and responding to diseases, pests, and invasive species; improved fire management; and protection against coastal armoring. Laws and institutions that monitor and protect public health also need to be updated to incorporate climate-induced effects. Reforms include, inter alia, those to early warning systems, evacuation and emergency response systems, and a comprehensive disaster response system, and responses to an increased range and incidence of tropical disease.

In addition to the sector-specific modifications, adapting to climate change will also entail broad systematic changes to both environmental and administrative law. One possible measure would be to require, by statute or executive order, all government agencies to consider the effects of climate change on their planning, programs, permitting, and other activities. A more modest and complementary measure would be to amend NEPA and/or the Council on Environmental Quality regulations implementing NEPA to require consideration of the potential impacts of climate change on the proposed project, as well as the impacts of a project on climate change. It may be necessary to develop new approaches that ensure effective involvement of stakeholders in adaptation processes while also enabling agencies to take action in a timely manner. Indeed, on Jan. 2, 2008, the Department of the Interior proposed to amend its rules implementing NEPA to incorporate adaptive management (albeit without mentioning climate change). Although necessary, such regulatory reforms may not reach their full potential. Professor J.B. Ruhl

has proposed a National Adaptive Management Act, akin to NEPA or the Administrative Procedure Act, because he believes that "there is good reason to doubt whether regulation by adaptive management is possible without substantial change in the administrative law system."

Moving Forward

Is "adaptation law" really necessary? Is it not possible simply to make a few tweaks to the existing laws and institutions? Most of environmental laws—whether in the United States or elsewhere—are predicated on an equilibrium model of the natural world. Scientists discredited this model in the 1980s, but the laws persist. Climate change has demonstrated that the natural and social realms governed by our laws are dynamic, and our laws must incorporate a similar dynamism. Central to this dynamism are uncertainties regarding the precise current conditions, immediate and long-term futures, and the effectiveness of legal, institutional, economic, and other measures.

The transition to adaptation likely will focus on four issues. First, it is necessary to build trust. Policymakers, regulated entities, and the public must become more comfortable managing with uncertainty. This trust can be developed through carefully constructed and implemented adaptive management pilot projects at various geographic and political levels. Second, mechanisms for collecting and sharing information need to be strengthened. Most countries have such mechanisms, but they often suffer from inadequate staff, funding, and technical resources. In addition, a clear legal framework for adaptive water management can provide a mandate as well as address barriers to sharing information. Third, processes need to be developed to assess periodically the information that has been gathered. The processes for collecting, sharing, and assessing must be tailored to the underlying issues that need to be understood, and it is crucial to articulate these issues clearly and specifically. Moreover, it is important to determine—at the outset, if possible—how to resolve differing interpretations of the data. Finally, there needs to be an ability and willingness to revise periodically the laws, regulations, permits, and other measures based on the findings of the assessments. Because provisions requiring periodic revision are not a part of most current environmental laws, especially in developing countries, policymakers need to be educated about why and how to draft the provisions.

Adaptation law, and particularly adaptive management, may be introduced gradually, in an adaptive manner. A number of confidence-building measures can be undertaken without legal development or other governmental action. Such confidence-building measures can generate consensus for adaptive management, promote understanding of different constructs of adaptive management, and provide lessons learned to guide the subsequent development and implementation of adaptive management. Specific measures could include: dialogues on adaptive management for government officials; engaging stakeholders and other civil society members in the discussions; improving information collection, for example, through an information clearinghouse; conducting periodic assessments regarding the state of natural resources; developing guidance, reference, and training resources on adaptation and adaptive management; and establishing and cultivating networks of stakeholders that are interested in adaptation and adaptive management. Public participation is likely to be particularly important. Adaptation may entail some dramatic changes in how people live. Education and engagement will be essential in helping people to understand and accept the coming changes.

Much work remains to reform our environmental governance frameworks to adapt to climate change. It will be necessary to research lessons learned in building resilience and adaptive capacity; identify, describe, and share types of adaptation strategies and resilient structures; pilot-test adaptation strategies and governance structures; share and, where appropriate, scale up particular approaches; and build capacity to develop, implement, monitor, and reform laws, regulations, and institutions to adapt to climate change.

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