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The Global Warming Crisis: An Analytical Framework to Regional Responses

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My flocks feed not,
My ewes breed not,
My rams speed not,
All is amiss . . .
Clear wells spring not,
Sweet birds sing not,
Green plants bring not
Forth their dye.

William Shakespeare
Passionate Pilgrim 17.1-2, 25-6

There is no doubt that global warming and climate change exist. It is also certain that global warming is the result of humanity polluting the atmosphere with so-called greenhouse gases, most notably, carbon dioxide, which trap heat from the sun by preventing ever greater amounts of the sun's heat from radiating back into space. It is also without doubt that global warming poses a threat to the well-being of all living creatures, including all of humanity.

This Article examines certain selected regional responses to global warming and sets forth some standards by which the effectiveness of such responses might be measured. Part I of the Article begins by examining the causes of global warming and its likely devastating consequences for humanity and all living things. Part II defines and analyzes the nature of regional responses to global warming. In so doing, the Article describes a number of existing regional responses and concludes with a discussion of how the success of such responses might be evaluated. Parts III, IV, and V of the Article describe how regional approaches to the climate crisis might prevent additional global warming, achieve adaptation to global warming, and protect humanity from global warming consequences. The use of the term "adaptation" in Part IV is a term of art that has arisen within the context of responses to global warming. Thus, rather than referring to how humanity or any individual species might adapt to global warming, adaptation in this Article refers to how humanity might act to preserve natural services, such as clean drinking water, clean air, and biodiversity.

Part VI of the Article takes a preliminary look at Oregon's governmental responses to global warming and suggests initial predictions as to how effective such responses might be. In general, the conclusions reached in Part VI regarding the effectiveness of Oregon's global warming response are not reassuring.

I

ARE WE READY FOR THAT WHICH AWAITS US

A. *The Global Warming Debate is Over*

In one of the most remarkable instances of scientific consensus ever witnessed in modern times, the global scientific community has reached agreement that global warming is real, in progress, and capable of enormous adverse consequences to all life forms on the planet.¹ For example, global warming can drive plant and animal species to extinction and subject humanity to enormous social and economic dislocation (i.e., suffering).² The global scientific community has further concluded that the primary cause of the present steep rise in average global temperatures and resulting climate changes is human behavior.³ The behaviors in question may be summed up as all those that cause the release of so-called "greenhouse gases" (GHG). This dismal scenario can be expressed formulaically as: DAI + BAU = AMD. Here, DAI refers to "dangerous anthropogenic interference"; BAU refers to "business as usual"; and AMD refers to "adapt, migrate or die."

Although the topic of global warming is dangerously far from becoming a prevalent topic in the mainstream media (at least in

¹ INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT, SUMMARY FOR POLICY MAKERS (2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf [hereinafter IPCC REPORT]. For a more comprehensive, complete version of all aspects of global warming, see INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS (2007), available at <http://www.ipcc.ch/ipccreports/ar4-wg1.htm> (analyzing a multitude of current and credible publications addressing all conceivable aspects of global warming and together representing a remarkable consensus among scientists, especially climatologists, science writers and many more).

² See IPCC REPORT, *supra* note 1, at 10 fig.SPM.7; see also *infra* notes 4–6.

³ IPCC REPORT, *supra* note 1, at 5.

the United States),⁴ the years 2005 to the present have nevertheless witnessed increased attention to global warming as evidenced by a remarkable output of books, articles, and even an Oscar-winning movie.⁵ The leaders in this movement are figures like the globe-trotting prophet Al Gore and the unstoppable NASA climate scientist Jim Hansen. Indeed, so much research and publication has been generated by the topic of global warming and climate change that some authors are already

⁴ See AL GORE, *AN INCONVENIENT TRUTH: THE PLANETARY EMERGENCY OF GLOBAL WARMING AND WHAT WE CAN DO ABOUT IT* 262–64 (2006) (comparing the certainty regarding climate change in peer-reviewed scientific articles with the uncertainty regarding climate change in the popular press and analogizing the manipulation of the popular press to the tobacco industry’s approach to challenging scientific truth: “Doubt is our product”); see also EUGENE LINDEN, *THE WINDS OF CHANGE: CLIMATE, WEATHER, AND THE DESTRUCTION OF CIVILIZATIONS* 219 (2006) (providing a graph and supporting narrative demonstrating the increasing and remarkable degree of scientific consensus regarding the nature, magnitude, timing, and consequences of climate change with the relative indifference of the general public); Ross Gelbspan, *Reality Check: The Global Warming Debate is Over. It’s Real, Inexorable, and Headed Our Way*, *E: THE ENVIRONMENTAL MAGAZINE*, Sept.–Oct. 2000, at 24–25, available at <http://www.emagazine.com/view/?1049&src=> (discussing the oil and coal industries control over the mainstream media).

⁵ See, e.g., GORE, *supra* note 4; ELIZABETH KOLBERT, *FIELD NOTES FROM A CATASTROPHE: MAN, NATURE, AND CLIMATE CHANGE* (2006); BILL MCKIBBEN, *THE END OF NATURE* xxiii (2006); MARK BOWEN, *THIN ICE: UNLOCKING THE SECRETS OF CLIMATE IN THE WORLD’S HIGHEST MOUNTAINS* (2005); FREDERICK BUELL, *FROM APOCALYPSE TO WAY OF LIFE: ENVIRONMENTAL CRISIS IN THE AMERICAN CENTURY* (2004); JOHN D. COX, *CLIMATE CRASH: ABRUPT CLIMATE CHANGE AND WHAT IT MEANS FOR OUR FUTURE* (2005); TIM FLANNERY, *THE WEATHER MAKERS: HOW MAN IS CHANGING THE CLIMATE AND WHAT IT MEANS FOR LIFE ON EARTH* (2005); Christopher Flavin, *Preface to THE WORLDWATCH INST., STATE OF THE WORLD 2006* (Linda Starke ed., 2006); DINYAR GODREJ, *THE NO-NONSENSE GUIDE TO CLIMATE CHANGE* (3d ed. 2006); ROBERT HENSON, *THE ROUGH GUIDE TO CLIMATE CHANGE: THE SYMPTOMS, THE SCIENCE, THE SOLUTIONS* (2006); BRUCE E. JOHANSEN, *GLOBAL WARMING IN THE TWENTY-FIRST CENTURY: OUR EVOLVING CLIMATE CRISIS* (2006); CHAD KISTER, *ARCTIC MELTING: HOW CLIMATE CHANGE IS DESTROYING ONE OF THE WORLD’S LARGEST WILDERNESS AREAS* (2005). For an example of how popular support is being elicited on a large scale by activists and celebrities worldwide, see Live Earth: The Concerts for a Climate in Crisis, <http://www.liveearth.org/> (last visited Mar. 4, 2008). This worldwide event was held on July 7, 2007, and brought twenty-four hours of music and information about the threat of global warming to more than two billion people. Press Release, Live Earth, *Live Earth Breaks World-Wide Audience Records*, (July 23, 2007), available at <http://www.liveearth.org/?p=237>. According to MSN statistics more than eight million people worldwide watched the event on the MSN Internet feed, with a peak simultaneous viewership of almost a quarter million people. *Id.*

writing of the discovery of global warming in historical terms.⁶ Despite the fact that humanity stands at the threshold of a remarkable scientific consensus regarding global warming, both the general public and its political leaders possess, at best, a spotty understanding of the issues surrounding global warming and of global warming itself. Consequently, our battle against global warming is far from being finished. Indeed, the massive effort required of all humanity to even mitigate the effects of global warming is only beginning. In the interim, the planet's ice will continue to melt; species will continue to adapt, migrate, or die; and our collective human suffering from the effects of global warming and climate change will increase exponentially.

B. *Natura Non Facit Saltum*

We can thank Plato and Aristotle for the seemingly unassailable proposition, *Natura Non Facit Saltum*.⁷ This statement, that “nature does not make leaps,” has long been a primary assumption in our understanding of how our planet moves and changes. While events such as earthquakes may occur with devastating rapidity, we are more inclined to define nature's time-frame in geological terms. For example, we easily accept that the Colorado River required millions of years to slowly etch out the geographic colossus called the Grand Canyon and even more millions of years for today's continents to ever-so-gradually separate and take their present places as the result of immensely powerful and immensely slow tectonic forces.

1. Climate Change is Abrupt

Science and humanity have long assumed that Plato's and Aristotle's observation applied to climate changes just as it applies to geologic or tectonic changes. However, as the global scientific community has discovered, when it comes to climate,

⁶ See SPENCER R. WEART, *THE DISCOVERY OF GLOBAL WARMING* (2003); see also GALE E. CHRISTIANSON, *GREENHOUSE: THE 200-YEAR STORY OF GLOBAL WARMING* (2000). For a discussion of emerging global responses to climate change and ozone depletion since the 1980's, see MATTHEW J. HOFFMANN, *OZONE DEPLETION AND CLIMATE CHANGE: CONSTRUCTING A GLOBAL RESPONSE* (2005).

⁷ See SCOTT GORDON, *THE HISTORY AND PHILOSOPHY OF SOCIAL SCIENCE* (1991).

change occurs, not at a snail's pace, but abruptly.⁸ The consequence of this reality cannot be understated. Because climate change occurs so abruptly, humanity has very little time to correct for its history of near-complete indiscretion in discharging GHGs into the atmosphere. Accordingly, as will be discussed later in this Article, one of the key measurements of the efficacy of various climate change initiatives will be the rapidity with which they can be put into play and, once in play, the rapidity with which they can slow, stop, or reduce global greenhouse emissions.

2. *Feedback Loops: Albedo*

While this Article need not devote substantial space to the scientific causes of climate change, it is important to briefly review the dynamics that throw a timing curveball into any human response. In the scientific realm, these curveballs are called feedback loops. One of the most ominous and easily understood feedback loops involves the scientific measurement of albedo and the consequences of the melting of arctic icepacks on albedo. Stated simply, albedo is the reflectivity of an object. In the context of global warming, albedo refers to a given surface's ability to reflect the sun's rays back into space. Thus, an albedo of one refers to complete reflectivity. On the other hand, an albedo of zero refers to a condition of no reflectivity and total absorption of the sun's energy. In the case of glacial and polar ice on earth, the albedo is nearly one. This value is good as the ice reflects back into space almost all of the rays striking it, except for those absorbed by GHG in the atmosphere. On the other hand, when the ice melts, it becomes water, which has an albedo approaching zero, meaning that it absorbs almost all of the sun's energy striking it. The important consequence of this is that as the earth's increasing temperatures

⁸ See COX, *supra* note 5, at 116–19 (“So much for the time-honored maxim of Aristotelian thinking: *Natura non facit saltum*—nature does not make leaps. When it comes to changing climate, it turns out that making leaps is *exactly* nature's way.” (emphasis in original)); see also FRED PEARCE, WITH SPEED AND VIOLENCE: WHY SCIENTISTS FEAR TIPPING POINTS IN CLIMATE CHANGE, xxiv (2007) (“[G]lobal warming will very probably unleash unstoppable planetary forces. And they will not be gradual. The history of our planet's climate shows that it does not do gradual change. Under pressure, whether from sunspots or orbital wobbles or the predations of humans, it lurches—virtually overnight.”).

cause ever more ice to melt, the planet not only loses reflectivity, it gains absorptive characteristics, creating a classic climatic feedback loop of exponentially increasing heat remaining trapped within the atmospheric membrane.⁹ Studies of the rate of ice melting on a global scale have returned increasingly unsettling results, which portend increasingly dismal consequences for the earth's inhabitants.

C. The Time to Act is Now

As noted above, time is of the essence in combating global warming. Simply put, we have no time left to debate the nature, existence, and consequences of global warming. Instead, we must take immediate, urgent steps to reduce GHG emissions and to mitigate the harm that the GHGs already released into the atmosphere can and will cause. Our response to the conclusions of the global scientific community must be no less urgent, sustained, and immense than was our commitment to fighting two world wars. The scientific bases on which our actions must be governed must be no less rigorous and well thought out than those which allowed us to achieve the landing of a spacecraft on the moon. Unfortunately, there is a huge disconnect between the extensive work of climate scientists, and the economic, legal and political barriers to taking the necessary steps for slowing down and reversing global climate change.

D. Harms of Unprecedented Magnitude

Global warming concerns *at least* the following: mass extinctions of native species on a scale the planet has never before witnessed; melting of the polar icecaps (resulting in the death and destruction of their plant, animal, and human inhabitants and rising oceans worldwide); coastline flooding; increases in droughts; and an increase in the frequency and severity of extreme weather events. Following on the heels of such mega-disasters will be global mass starvation, global mass

⁹ See GRETTEL EHRLICH, *THE FUTURE OF ICE: A JOURNEY INTO THE COLD* 46–47 (2004) (“Worldwide, glaciers are on the wane. As a result, the albedo effect—the ability of ice and snow to deflect heat back into space—is declining as glaciers melt and less and less snow covers the ground each winter.”); *see also*, BOWEN, *supra* note 5, at 66–68; Tim Appenzeller, *The Big Thaw*, *NAT’L GEOGRAPHIC*, June 2007, at 56–64.

migration, economic disruption, political disruption, political unrest, revolt, and war.¹⁰ As can be inferred from the above, global warming will result in the earth becoming a lonelier planet, stripped of its charismatic mega-fauna; for example polar bears and the giant panda as well as creatures of every size and type imaginable.¹¹ Global warming will set in motion a transition from an Edenic garden of delightfully lovely and edible plants to a weedier, more toxic and uninhabitable planet. Adding all of these horrors to even more that await us should we fail in our mission to combat global warming augers not only for the collapse of individual societies and civilizations but all of civilization itself. Unless we act collectively, swiftly, and correctly, within the lifetimes of those now living, we will have not only envisioned such a nightmare as just described, we will have made it a reality.

II REGIONALISM ANALYZED

A. Regionalism Defined

Although this Article primarily focuses on “regionalism” in the context of combating global warming, the term is used loosely in this Article to denote any cooperative amalgamation of smaller units, whether such units are similar (e.g., states) or dissimilar in nature (e.g., states and non-governmental entities such as land trusts). For the purposes of this Article, the key defining feature of regionalism is the attempt by two or more entities to leverage their mutual efforts against global warming by forming relationships in which the cumulative effect is greater than the sum effect of such entities were they to proceed independently. On occasion, such entities may join forces to generate a regional response to threats to a core natural resource such as a lake, a river, an ecosystem, or one or more species. Regional relationships create a level playing field that allows its

¹⁰ See generally ROBERT STROM, *HOT HOUSE: GLOBAL CLIMATE CHANGE AND THE HUMAN CONDITION* (2007); ROSS GELBSPAN, *BOILING POINT: HOW POLITICIANS, BIG OIL AND COAL, JOURNALISTS AND ACTIVISTS HAVE FUELED THE CLIMATE CRISIS—AND WHAT WE CAN DO TO AVERT DISASTER* (2004).

¹¹ *On the Brink*, in *GLOBAL WARMING: THE CAUSES, THE PERILS, THE SOLUTIONS, THE ACTIONS: WHAT YOU CAN DO*, 30 (Kelly Knauer ed., 2008) [hereinafter *GLOBAL WARMING*].

participants to engage in anti-global warming activities which, if undertaken alone, might create economic and/or regulatory disincentives in relation to other competitive markets. One other key feature of regionalism is that it cannot be compelled but, instead, is the product of mutual and voluntary cooperation.¹²

B. Why Regionalism Might Work

1. Absolute Standards

Regionalism, as an alliance to combat global warming, must be guided, not by lawyers and politicians, but by the scientists who inform them. Society needs absolute standards that take the form of allowable units of GHG emissions, percentages of historical numbers of units of GHG emissions, and exact time frames tied to mathematically defined goals. Emission offsets, cap-and-trade systems, carbon taxes, and other forms of carbon markets and finance controls will likewise function as dictated by the mathematics and time frames of science and/or economics.

2. Carbon Math

Within our lifetimes we will all have to become students of carbon math.¹³ For example, we will collectively and individually have to learn how to calculate our “carbon footprint,” the net

¹² See Kirsten H. Engel, *Mitigating Global Climate Change in the United States: A Regional Approach*, 14 N.Y.U. ENVTL. L.J. 54, 59 (2005).

¹³ The phrase “carbon math” was first coined by Professor Mary Christina Wood. Professor Wood explained carbon math as follows:

Scientist[s] are clear that any climate heating beyond 1 degree C. more than what is already in the pipeline is dangerous. So this is Nature’s Mandate—to not go beyond 1 degree C.

To achieve a cap at 1 degree C, atmospheric carbon levels may not exceed 450 ppm. And to maintain carbon levels below 450 ppm, the total atmospheric load of carbon may not exceed 935 billion tons. We are now at 880 billion tons. We have 55 billion tons to go before plunging the planet over that danger threshold. We are putting out 8.2 billion tons a year. As you can see, Nature’s Mandate is really a matter of *carbon math*. But it’s math in a minute glass, because Nature has kicked in its own feedback loops that are now accelerating carbon emissions.

Mary Christina Wood, *Nature’s Trust: A Legal, Political, Economic, and Moral Frame for Global Warming*, DOWN TO EARTH, Aug. 2007, at 2 available at <http://www.meic.org/files/energy/global-warming/NaturesTrust.NEW.pdf> (emphasis added).

amount of carbon we directly or indirectly inject into the atmosphere. Such calculations will require that we understand and are able to measure the amount of carbon infused into the atmosphere by our individual actions. We will become versed in how much carbon our automobiles emit on a trip to the market and how much carbon was expended in making the roads we drive on, building the supermarket we shop at, and harvesting, packaging, cooling, and transporting the items we purchase. No action, no matter how seemingly small, comes without a carbon price tag. We must learn to calculate these carbon price tags with alacrity.¹⁴

Applying carbon math to what climatologists refer to as business as usual (BAU), scientists have predicted that the planet's temperature will increase by up to 11.52 degrees Fahrenheit over the next century.¹⁵ NASA weather scientist Jim Hansen has concluded, "[a]ny responsible assessment of environmental impact must conclude that further global warming exceeding two degrees Fahrenheit [1.1 degrees Celsius] will be dangerous."¹⁶ An increase in world temperature of a mere five degrees Fahrenheit would bring with it an eighty-foot rise in the world's oceans.¹⁷ Such a scenario would put the United States' East Coast harbor cities under water.¹⁸ It is estimated that a rise in sea levels to eighty feet would displace 250 million people in China, 120 million people in Bangladesh, and 150 million people in India.¹⁹ According to Jim Hansen, we have just ten years to avoid the doomsday scenario of a five-

¹⁴ One barrier to a truly usable and useful carbon math will be the standardization, on a global scale, of the units of measurement of GHG emissions, of GHGs currently in the atmosphere, of temperatures and of time frames. Thus far this has not happened, leaving us speaking in different tongues such as Fahrenheit and Celsius and parts per million and metric tons.

¹⁵ *State of the Planet*, in GLOBAL WARMING, *supra* note 11, at 20.

¹⁶ Jim Hansen, *The Threat to the Planet*, 53 N.Y. REV. OF BOOKS 12, 14 (2006), available at <http://www.nybooks.com/articles/19131>. The International Panel on Climate Change (IPCC) likewise predicts that even if humanity stopped using all GHGs immediately, global temperatures would still rise 1.1 degree Fahrenheit by 2100. Mark Hertsgaard, *Killer Weather Ahead*, THE NATION, Feb. 26, 2007, at 5. Even under the very best scenarios, global temperatures may rise by 2 degrees Fahrenheit by 2100; however, a range of between 3.2 to 7.2 degrees is far more likely. *Id.*

¹⁷ *Id.* at 13.

¹⁸ *See id.*

¹⁹ *Id.*

degree temperature increase in the next one hundred years.²⁰ This is not ten years to decide to act; it is ten years to act with utmost urgency.²¹ More recently, this time frame has collapsed. For example, a report by the Union of Concerned Scientists concludes that the United States must reduce its emissions by four percent per year beginning a short two years from now.²² This two-year period is considered the *maximum* amount of time the United States has to achieve the *minimum* possible GHG emission reductions necessary to avoid a two degrees Celsius (3.6 degrees Fahrenheit) increase in global temperature.²³

Even if humanity were to stop using GHGs immediately, the continuing long-term effects of atmospheric GHGs could cause the earth's temperature to exceed the two degree threshold because the volume of GHGs in the atmosphere at the present time is so great.²⁴ Again, we must act urgently, quickly, and collectively.

3. *A Team Approach*

A heightened and formalized team approach will prove crucial to regionalism because no one entity has the resources to carry out its proportionate share of GHG reduction, provide adaptation, and meet the basic needs of its citizens. In order to avoid government collapse from the deficiencies of single jurisdictions, other sovereigns, as well as entities from both the profit and non-profit sectors, must discover new and more effective ways to join forces to carry out these functions. Advantages of regionalism include shared information and resources, a level playing field, greater political clout, and the simple, but profoundly important, multiplication of the efforts of the few into the efforts of many. Regional cooperatives themselves may ultimately band together to form mega-regions, perhaps even to the extent of spanning continents or crossing international borders.

²⁰ *Id.* at 16.

²¹ *Id.*

²² Union of Concerned Scientists, *A Target for U.S. Emissions Reductions*, http://www.ucsusa.org/global_warming/science/emissionstarget.html (last visited Apr. 29, 2008).

²³ *Id.*

²⁴ Hertsgaard, *supra* note 16, at 5.

A regional team approach also has the advantage of self-policing. Because regional efforts are almost always voluntary and cooperative, they are by their fundamental nature collectively committed to agreed-upon goals. Accordingly, little “push-back” results as compared to when goals are imposed by regulation or other coercive means. Instead, the energy and intellect that might have been directed at avoiding or even subverting a regulatory scheme is used to find ways to become more compliant with the goals of the group. As well as creating a self-policing system, regional cooperatives can also generate a positive competitiveness among its members. Such competitiveness can help eliminate “slacker” members responsible for “orphan shares”²⁵ of GHG reductions and push the entire regional collective toward its goals at a faster rate than would occur with members acting individually.

4. Size

The increased size of areas under regional control presents a number of advantages.²⁶ One obvious advantage is simply the potential for greater reductions in GHG emissions because of the greater area covered.²⁷ Regionalism also allows for uniform standards.²⁸ Uniform standards can avoid what would otherwise be unfairly competitive business advantages held by governments that use financial incentives to entice businesses into locating to one area rather than another. Still another advantage is that if an emissions-trading regime is instituted, a larger market will provide more players and a greater likelihood of success.²⁹

²⁵ See Mary Christina Wood, *Atmospheric Trust Litigation*, in ADJUDICATING CLIMATE CHANGE: SUB-NATIONAL, NATIONAL, AND SUPRA-NATIONAL APPROACHES (William C.G. Burns & Hari M. Osofsky, eds., forthcoming 2008) (manuscript at 13-14), available at <http://www.law.uoregon.edu/faculty/mwood/docs/atlpaper.pdf> (“An orphan share is a share of liability for which the liable party does not take responsibility. In the context of carbon reduction, any significant orphan share is likely to defeat efforts to reduce emissions adequately in the short time frame needed.”).

²⁶ See Engel, *supra* note 12, at 69–70.

²⁷ *Id.* at 69.

²⁸ *Id.* at 69–70.

²⁹ *Id.*

C. Varieties of Regionalism

As discussed above, the term regionalism when used in the abstract conveys relatively little helpful information. However, when applied to specific categories, the term becomes more meaningful. There are several constructs of regionalism that can fortify a climate change response.

1. Political Boundaries

One category of regional cooperatives is based on pre-existing political boundaries. Examples of such boundaries include municipalities, counties, states, and nations. These categories are briefly examined below.

a. Jurisdiction and Its Consequences

Political jurisdictions such as towns, cities, counties, and states have the inherent advantage of already existing. These jurisdictions also carry multiple disadvantages. First, such jurisdictions are accustomed to functioning independently. Rather than forming cooperative unions, competition is their normal operating mode. A familiar example, mentioned above, is when one jurisdiction offers more favorable tax consequences than neighboring jurisdictions hoping to entice more businesses and employees into its boundaries. The theory is that lower taxes will enlarge the tax base and fill the jurisdiction's coffers with additional funding.

Another problem, or rather set of problems, is that each of these categories of jurisdictions, with few exceptions, operates using a political model borrowed from federal government. Thus, each jurisdiction can be expected to have its equivalent executive, legislative, and judicial branch. Simply stated, decisions in such jurisdictions are rarely made by one individual and, instead, must pass muster before a series of decision-making bodies before becoming law. Finally, prohibitions may exist on certain jurisdictions that act on their own (i.e., without the blessing of the federal government) to form the political alliances that constitute regionalism.³⁰

³⁰ See, e.g., *id.* at 73 (“Our federal system of government provides no special powers or status to cooperative regional ventures between states.”).

b. Nested Jurisdictions

“Nested jurisdictions” is a term used in this Article to describe the fact that, in the United States’ system of government, each jurisdiction is a sub-part of a larger jurisdiction with one final, top-level jurisdiction.³¹ Typically, each step up the hierarchy of nested jurisdictions finds a higher jurisdiction, with power over the actions of the lower jurisdiction, except to the extent that certain powers are reserved to the lower jurisdictions to give them some autonomy over their decision-making ability. The typical stair-step of power is municipality, county, state, and federal government. There are, of course, many exceptions. The most easily identified is that of the City of New York compared to the State of New York, where the municipality is a far more densely populated and powerful entity than the state in which it is located. Nested jurisdictions are significant because they may create insurmountable obstacles to politically-based regionalism, for example, if the lower-level jurisdictions are able to ignore or escape the mandates of the higher-level jurisdictions. The converse can also wreak havoc with regionalism. For example, if the lower levels of government form anti-global warming cooperatives, there may likely be nothing to persuade higher levels of government to join in, thus leaving a patchwork attempt at regional controls over global warming causing activities.

c. Overarching Jurisdictions, Interstate Compacts, and Collaborative Groups

One of the rarest, yet potentially most effective, forms of jurisdiction arises from a federal act providing an overarching and legal framework with jurisdiction over what otherwise would

³¹ See Wood, *supra* note 25 (manuscript at 18–19) (using the concept of “nested jurisdictions” to describe carbon responsibilities in multi-level sovereign frameworks); see also NESTED IDENTITIES: NATIONALISM, TERRITORY, AND SCALE (Guntram H. Herb & David H. Kaplan eds., 1999) (discussing how political, social, economic, and ethnic factors can determine regionalism; the existence of regions in terms of their relationships to specific physical territories; and the vertical integration of regions based upon scale resulting in regions and sub-regions). *But see* DOUGLAS REICHERT POWELL, CRITICAL REGIONALISM: CONNECTING POLITICS AND CULTURE IN THE AMERICAN LANDSCAPE (2007) (taking as a fundamental assumption that regions are never politically or judicially defined and noting that “[r]egions never have flags”).

be a *mélange* of municipal, county, and state governments. Models of such overarching legal frameworks include those created to regulate major bodies of water. Two are described below. The features of such overarching regulatory frameworks which expand jurisdiction across multiple governmental entities are suitable to the climate context as well.

(i) *Tahoe Regional Planning Agency*

The first example of an overarching legal framework governing multiple jurisdictions is the Tahoe Regional Planning Agency (TRPA). The political origin of the TRPA was a bi-state compact between the two states having jurisdiction over the Lake Tahoe shoreline: Nevada and California.³² This bi-state compact³³ was ratified by Congress in 1969, thus creating the TRPA.³⁴ Over a period of years, during which a number of revisions took place, the TRPA was given the authority to adopt and enforce environmental quality standards.³⁵ After weathering lawsuits and extended negotiations, the TRPA adopted the 1987 Regional Plan, a land use overlay which is still in effect today.³⁶ The TRPA website notes:

TRPA was the first bi-state regional environmental planning agency in the country. The survival of TRPA, despite the controversy over the last 20 years, is a tribute to the men and women who had the vision and the courage to try something that had never been tried before. Preservation of the

³² See Tahoe Regional Planning Agency, About TRPA, <http://www.trpa.org/default.aspx?tabindex=0&tabid=3> (last visited Mar. 28, 2008); see also Tahoe Regional Planning Compact, Pub. L. No. 96-551, 94 Stat. 3233 (1980).

³³ For a cogent and current discussion of the use of interstate compacts to fight climate change see Claire Carothers, Note, *United We Stand: The Interstate Compact as a Tool for Effecting Climate Change*, 41 GA. L. REV. 229 (2006). Carothers defines an interstate compact as “a contract replacing preceding and conflicting state statutes. Once enacted, provisions of a compact replace state laws, thus the sovereignty of the participating states is diminished by the terms of the agreement.” *Id.* at 237; see also Allyson Barker et al., *The Role of Collaborative Groups in Federal Land Resource Management: A Legal Analysis*, 23 J. LAND RESOURCES & ENVTL. L. 67 (2003) (comprehensively discussing formerly adversarial groups that have formed collaborative groups to address land use issues).

³⁴ Tahoe Regional Planning Agency, *supra* note 32.

³⁵ *Id.*

³⁶ *Id.*

environment is a cause that is now widely supported by both residents and visitors to the Lake Tahoe Region.³⁷

(ii) *Columbia River Gorge National Scenic Area Act*

The second of these overarching jurisdictional frameworks is the Columbia River Gorge National Scenic Area Act (Columbia River Gorge Act).³⁸ Like the TRPA, the Columbia River Gorge Act functions as a partnership.³⁹ The partnership involves two states, Washington and Oregon, and six counties, all of which border on the Columbia River.⁴⁰ The partnership also includes the U.S. Department of Agriculture Forest Service and calls for “interagency and tribal cooperation and coordination.”⁴¹

The Columbia River Gorge Act is administered by the Columbia River Gorge Commission.⁴² Among the Columbia River Gorge Commission’s responsibilities are “planning for the Scenic Area, implementation of the National Scenic Area’s Management Plan, and monitoring and hearing appeals of land-use decisions The local counties and the Gorge Commission are responsible for drafting and enforcing land-use ordinances to implement the Management Plan.”⁴³

One interesting aspect of the Columbia River Gorge Act, which is lacking in other regional cooperatives, is that it is closely monitored by a non-profit watchdog organization called “Friends of the Columbia Gorge.”⁴⁴ Armed with its own attorney, full-time staff, and a board comprised of wealthy and influential citizens, this group not only helped get the Columbia River Gorge Act enacted, it has spent years guiding it, and, when necessary, correcting its course. It is also likely, based on this author’s observations, that there has never been a land use case

³⁷ *Id.*

³⁸ Columbia River Gorge National Scenic Area Act, 16 U.S.C. §§ 544–544p (2006); see also Bowen Blair, Jr., *The Columbia River Gorge National Scenic Area: The Act, Its Genesis and Legislative History*, 17 ENVTL. L. 863 (1987).

³⁹ See Columbia River Gorge National Scenic Area: About Us, <http://www.fs.fed.us/r6/columbia/about/> (last visited Mar. 29, 2008).

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.*

⁴⁴ See Friends of the Columbia Gorge, Our Mission and Vision Statements, <http://www.gorgefriends.org/about> (last visited Mar. 29, 2008).

that involved the Columbia River Gorge in which the Friends of the Columbia Gorge has not been a party. Indeed, so effective has this organization been that it is worth considering the formation of a well-endowed activist watchdog organization as part of any large scale anti-global warming scheme overseen by otherwise purely governmental entities.

d. Cooperating Jurisdictions

“Cooperating jurisdictions” refers to jurisdictions that have established cooperative relationships without the command and control features of an overarching legal framework (such as the examples discussed above). This Article discusses two examples of cooperating jurisdictions.⁴⁵

(i) Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative (RGGI) is a cooperative enterprise by northeastern and mid-Atlantic states to reduce carbon dioxide.⁴⁶ The RGGI was initiated in April 2003, when then-New York Governor George E. Pataki called on governors of northeastern states to collaborate in reducing global warming pollution from power plants.⁴⁷ After a lengthy deliberation and negotiation process, seven states signed on to the program.⁴⁸ Those states were Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont.⁴⁹ This landmark program also created the nation’s first multi-state emissions trading program for carbon dioxide.⁵⁰ In 2007,

⁴⁵ See Barker et al., *supra* note 33 (discussing collaborative groups generally).

⁴⁶ Regional Greenhouse Gas Initiative: An Initiative of the Northeastern and Mid-Atlantic States of the U.S., <http://www.rggi.org/> (last visited Mar. 29, 2008).

⁴⁷ Regional Greenhouse Gas Initiative: About RGGI, <http://www.rggi.org/about.htm> (last visited Mar. 29, 2008).

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ See Union of Concerned Scientists, Global Warming: Regional Greenhouse Gas Initiative, http://www.ucsusa.org/global_warming/solutions/regional-greenhouse-gas-initiative.html (last visited Apr. 29, 2008); see also Michael H. Wall, Comment, *The Regional Greenhouse Gas Initiative and California Assembly Bill 1493: Filling the American Greenhouse Gas Regulation Void*, 41 U. RICH. L. REV. 567, 569–76 (2007) (analyzing the RGGI as an example of a “regional regulatory alliance”).

Massachusetts, Rhode Island, and Maryland also joined the RGGI.⁵¹

RGGI may be thought of as having three components. The first component is a Memorandum of Understanding (MOU).⁵² Among other things, the MOU sets a regional emissions cap at 121,253,550 short tons of carbon dioxide.⁵³ This gross figure is apportioned among the member states.⁵⁴ Second, the MOU provides that the member states shall collectively develop a draft model rule to create the regulatory authority to establish the program.⁵⁵ The third component is the creation of a “regional organization” (RO) which will have oversight authority over the program.⁵⁶ Among the RO functions are to serve as a deliberative forum, to track emissions and allowances, and to provide technical support to the states for the development of new “offsets” standards and implementation.⁵⁷ As of the date of this Article, the states have drafted a 141-page model rule; however, the actual program will not be launched until January 1, 2009.⁵⁸

As ground-breaking and encouraging as the RGGI may appear, it is more process than substance in that it lacks any guarantee of ever being put into action, affects only carbon dioxide emissions, and, most significantly, only applies to “fossil fuel-fired electricity generation.”⁵⁹ Thus, other than its potential as a model for more broad-reaching and ambitious programs, it is unlikely to have any significant impact on overall GHG emissions. It is, in other words, a lifeline, but a lifeline too short.

⁵¹ Regional Greenhouse Gas Initiative, *supra* note 46.

⁵² Regional Greenhouse Gas Initiative: Multi-State RGGI Agreement, <http://www.rggi.org/agreement.htm> (last visited Mar. 29, 2008).

⁵³ REGIONAL GREENHOUSE GAS INITIATIVE, MEMORANDUM OF UNDERSTANDING 2 (2005), *available at* http://www.rggi.org/docs/mou_12_20_05.pdf [hereinafter MEMORANDUM OF UNDERSTANDING].

⁵⁴ *Id.* at 2–3.

⁵⁵ *Id.* at 6–7.

⁵⁶ *Id.* at 7–8.

⁵⁷ *Id.*

⁵⁸ REGIONAL GREENHOUSE GAS INITIATIVE, PUBLIC REVIEW MODEL RULE DRAFT 03/23/06 11 (2006), *available at* http://www.rggi.org/docs/public_review_draft_mr.pdf.

⁵⁹ MEMORANDUM OF UNDERSTANDING, *supra* note 53, at 2.

(ii) Western Climate Initiative

The predecessor to the Western Climate Initiative (WCI) was the “West Coast Governors’ Global Warming Initiative,” which was launched in November 2004, by California Governor Arnold Schwarzenegger, Oregon Governor Ted Kulongoski, and Washington Governor Christine Gregoire.⁶⁰ A joint press release announced that the governors approved thirty-six recommendations in five areas of action jointly developed by all three states.⁶¹ The same press release touted four of these areas as “holding the most promise for achieving greenhouse gas reductions.”⁶² These areas were described as follows: (1) “[a]dopt comprehensive state and regional goals for greenhouse gas emissions reductions;” (2) “[a]dopt standards to reduce greenhouse gas emissions from vehicles;” (3) “[d]evelop a market-based carbon allowance program; and,” (4) “[e]xpand the markets for energy, efficiency, renewable resources, and alternative fuels.”⁶³

In a succinct and entirely accurate explanation for such a state-level initiative, David Danner, advisor to former Washington Governor Gary Locke, noted, “[s]tates are moving ahead in large part to fill the vacuum that has been left by the federal government.”⁶⁴

In February 2007, the West Coast Governors’ Global Warming Initiative morphed into the WCI by adding Arizona and New Mexico as full members.⁶⁵ Later that year, Utah,

⁶⁰ Press Release, West Coast Governors’ Global Warming Initiative, West Coast States Strengthen Joint Climate Protection Strategy (Nov. 18, 2004), available at http://www.climatechange.ca.gov/westcoast/releases/2004-11-18_JOINT_RELEASE.PDF.

⁶¹ *Id.* at 2.

⁶² *Id.*

⁶³ *Id.* at 3.

⁶⁴ Jennifer Lee, *The Warming Is Global but the Legislating, in the U.S., Is All Local*, N.Y. TIMES, Oct. 29, 2003, at A20; see also John Carey & Sarah R. Shapiro, *Global Warming*, BUS. WK., Aug. 16, 2004, at 60, available at http://www.businessweek.com/magazine/content/04_33/b3896001_mz001.htm (“The Bush Administration flatly rejects Kyoto and mandatory curbs, arguing that such steps will cripple the economy. Better to develop new low-carbon technologies to solve problems if and when they appear, says Energy Secretary Spencer Abraham.”).

⁶⁵ Western Climate Initiative, The Western Climate Initiative (WCI), <http://www.westernclimateinitiative.org/> (last visited Mar. 29, 2008). Among other

British Columbia, and Manitoba joined the initiative, followed by Montana in January 2008.⁶⁶ Like its predecessor, the West Coast Governors' Global Warming Initiative, the WCI cited a lack of federal leadership as a major factor in its creation.⁶⁷

Like the RGGI, the WCI is a major step in the right direction. However, also like the RGGI, it is only one step out of many more that must be taken. It suffers from the same forces of fear of regulation, political inertia, procedural friction, and any number of other economic, sociological and political hindrances that can be expected from an endeavor as large as regional carbon reduction. Perhaps the simplest measure of its efficacy is its timing. With GHGs in the atmosphere increasing with each given day, we are still only at the stage of teaching our governments and businesses how to *measure* GHG emissions and have only a few mechanisms in place to *regulate* them.

e. Facilitators, Standard Setters, Carbon Markets

(i) California Climate Action Registry

The California Climate Action Registry (CCAR) was established in 2001.⁶⁸ Unlike the RGGI and the WCI, the CCAR was not adopted by California solely for purposes of regulating carbon emissions. For example, in addition to measuring carbon dioxide, CCAR members also calculate methane and nitrous oxide emissions.⁶⁹ As stated in the CCAR General Reporting Protocol, the CCAR was developed as a "multi-stakeholder effort to develop a standardized approach to the voluntary reporting of GHG emissions."⁷⁰ The CCAR

goals, the initiative's members have agreed to reduce the region's emissions to 15% below 2005 levels by the year 2020. Press Release, Western Climate Initiative, Statement of Regional Goal (Aug. 22, 2007), available at <http://www.westernclimateinitiative.org/ewebeditpro/items/O104F13006.pdf>.

⁶⁶ *Id.*

⁶⁷ See Western Climate Initiative: Statements from WCI Governors and Premiers, <http://www.westernclimateinitiative.org/ewebeditpro/items/O104F13014.pdf> (last visited Mar. 29, 2008).

⁶⁸ California Climate Action Registry, Overview, <http://www.climateregistry.org/about.html> (last visited Mar. 29, 2008).

⁶⁹ Cal. Climate Action Registry, California Climate Action Registry General Reporting Protocol: Reporting Entity-Wide Greenhouse Gas Emissions 4 (2007) (Version 2.2), available at http://www.climateregistry.org/resources/docs/protocols/grp/GRPV2March2007_web.pdf.

⁷⁰ *Id.* at 1.

General Reporting Protocol also states that “the Registry provides leadership on climate change by promulgating credible and consistent GHG reporting standards and tools for organizations to measure, report, certify, and reduce their GHG emissions in California and/or the U.S.”⁷¹ Regarding GHG emission sources, CCAR members calculate indirect GHG emissions, GHG emissions from stationary combustion, GHG emissions from mobile combustion, and direct fugitive GHG emissions from such sources as refrigeration.⁷² The CCAR also boasts a remarkable number of voluntary members. As of March 21, 2008, the CCAR had a membership of 333 governmental bodies (e.g., cities and counties), government agencies, industries (e.g., oil and gas), and a plethora of businesses.⁷³ This accounting method could result in a standard protocol that the public, judges, and policy makers can use to evaluate carbon reduction progress across the nation.

(ii) *The Climate Registry*

A relatively new entity dedicated to developing uniform GHG reporting systems “capable of supporting voluntary and mandatory greenhouse gas emission reporting policies for its Members and Reporters” is succinctly named “The Climate Registry.”⁷⁴

As of March 2008, the Climate Registry was reported as having thirty-nine member states,⁷⁵ representing over 75% of the U.S. population.⁷⁶ Despite this seemingly propitious beginning,

⁷¹ *Id.* at 2. Among the advantages claimed by members are the following: addressing inefficiency by understanding emissions indicate waste; managing risk by developing credible measurement, verification, and reporting methods for participating in future emissions trading systems; showing environmental leadership; demonstrating action on GHG emissions; and preparing for regulation. *Id.* at 3.

⁷² *Id.* at chs. 5–9.

⁷³ California Climate Action Registry, Members, <http://www.climateregistry.org/about/members.html> (last visited Mar. 29, 2008).

⁷⁴ The Climate Registry, <http://www.theclimateregistry.org> (last visited Mar. 29, 2008).

⁷⁵ *Id.* Oregon joined thirty states in the Climate Registry as “founding members.” *Oregon Joins Climate Registry*, SALEM-NEWS.COM, May 9, 2007, http://salem-news.com/articles/may092007/oregon_climate_050907.php.

⁷⁶ *Registry Quick Facts*, CLIMATE ACTION NEWS (Cal. Climate Action Registry), June 2007, at 1 (email newsletter on file with author).

it is difficult to assess precisely what and how the Climate Registry will contribute to the national anti-global warming effort.

(iii) *The Climate Trust*

The Climate Trust based in Portland, Oregon, describes itself as “a leading non-profit organization dedicated to providing solutions to stabilize our rapidly changing climate.”⁷⁷ The Climate Trust states that its “sole mission . . . is to promote climate change solutions by providing high quality greenhouse gas offset projects and advancing sound offset policy.”⁷⁸ The Climate Trust has a number of clients, including power plants, regulators, businesses, and individuals.⁷⁹ The Climate Trust claims that “its projects are expected to offset nearly 2.6 million metric tons of carbon dioxide from \$8.8 million in investments—making [the Climate Trust] one of the largest and most experienced offset buyers in the U.S. and world markets.”⁸⁰

The Climate Trust represents a long history of concern over global warming in Oregon. In 1997, the Oregon legislature enacted the first law in the United States directed at reducing greenhouse gas levels.⁸¹ This law (the so-called “Oregon Standard”) required all new power plants in Oregon to offset part of their carbon dioxide emissions.⁸² In terms of its

⁷⁷ The Climate Trust, About the Climate Trust, http://www.climatetrust.org/about_us.php (last visited Mar. 29, 2008).

⁷⁸ *Id.* The Climate Trust defines “offsets” as follows:

A greenhouse gas (GHG) offset is generated by the reduction, avoidance, or sequestration of GHG emissions from a specific project. Offsets are so named because they counteract or offset greenhouse gases that would have been emitted into the atmosphere; they are a compensating equivalent for reductions made at a specific source of emissions.

The Climate Trust, Offsets Are Part of the Solution!, http://www.climatetrust.org/about_offsets.php (last visited Mar. 29, 2008). The “offset criteria” used by the Climate Trust requires that the proposed offset meet two “essential” tests: “[i]t must be demonstrated that an offset project would not otherwise occur without the funding provided by the offset purchaser” and “[r]esults must be rigorously quantified.” *Id.*

⁷⁹ The Climate Trust, About the Climate Trust, *supra* note 77.

⁸⁰ *Id.*

⁸¹ The Climate Trust, The Climate Trust’s History, http://www.climatetrust.org/about_us_history.php (last visited Mar. 29, 2008).

⁸² *Id.*

mechanics, the Oregon Standard allows power plants falling under its jurisdiction to offset emissions by paying mitigation funds to a non-profit organization meeting specified qualifications.⁸³ The organization receiving such mitigation funds must use those funds to purchase greenhouse gas offsets “that are generated by projects that avoid, sequester, or displace carbon dioxide on behalf of the power plant owners. The Climate Trust was chartered as such a qualified organization in 1997.”⁸⁴ The Climate Trust’s “Offset Portfolio” can be visited at the organization’s website.⁸⁵

(iv) The Energy Trust

Like the Climate Trust, the Energy Trust is based in Portland, Oregon.⁸⁶ The stated mission of the Energy Trust is “[t]o change how Oregonians produce and use energy by investing in efficient technologies and renewable resources that save dollars and protect the environment.”⁸⁷ The Energy Trust was created much more recently than Oregon’s Climate Trust. The Energy Trust began operation in March of 2002.⁸⁸ At that time it was charged by the Oregon Public Utility Commission (OPUC) with “investing in cost-effective energy conservation, helping to pay the above-market costs of renewable energy sources, and encouraging energy market transformation in Oregon.”⁸⁹

Energy Trust funding comes from a “1999 energy restructuring law”⁹⁰ which directed the two largest investor-owned utilities in Oregon to collect a three percent “public purposes” charge from their customers and authorized the OPUC to grant these funds to a non-governmental entity for investment.⁹¹ The Energy Trust formed as a non-profit

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ The Climate Trust, The Climate Trust's Offset Portfolio, http://www.climatetrust.org/offset_projects.php (last visited Mar. 29, 2008).

⁸⁶ Energy Trust of Oregon, Inc., Contact Us, <http://www.energytrust.org/about/contact/index.html> (last visited Mar. 29, 2008).

⁸⁷ Energy Trust of Oregon, Inc., Who We Are, <http://www.energytrust.org/who/index.html> (last visited Mar. 29, 2008).

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ *Id.*; see also S. 1149, 70th Leg. Assem., Reg. Sess. (Or. 1999) (engrossed).

⁹¹ Energy Trust of Oregon, Inc., Who We Are, *supra* note 87.

corporation specifically for that purpose.⁹² In November 2001, the Energy Trust entered into an agreement with the OPUC, which empowered the OPUC to guide the Energy Trust's work.⁹³ "In addition to its work under the 1999 restructuring law, the Energy Trust administers gas conservation programs for residential and commercial customers of NW Natural . . . and Cascade Natural Gas Corporation . . . and select programs for residential customers of Avista Corporation . . . in Oregon."⁹⁴

As a measure of the Energy Trust's current scale of operation, at least with regard to commercial and industrial clients, a recent news release stated that "Energy Trust's commercial and industrial programs have \$16.2 million available for energy studies and cash incentives for energy efficient measures in 2007, and funding will remain steady into the future."⁹⁵

2. *Topography*

The discussion above focused on politically-defined regions as one approach to regionalism. Another approach relies on natural "units" to establish boundaries for regional approaches to global climate change. While perhaps more realistic in the ecological sense, this method has taken a back seat to politically-defined regions for several possible reasons. A topographically-defined region could conceivably consist of a river, a lake, a waterfront, a savanna, or a mountain range. Indeed, in the cases of the TRPA and the Columbia River Gorge Act, those

⁹² *Id.*

⁹³ *Id.*

⁹⁴ *Id.* For 2007, the OPUC benchmarked the Energy Trust's performance, in part, against the following measures:

[1] Save at least 20 average megawatts of electricity, computed on a three-year rolling average basis at a levelized cost of no more than 2 cents per kilowatt-hour[; 2] Save at least 700,000 therms of gas, computed on a three-year rolling average basis at a levelized cost of no more than 40 cents per therm[;]

. . . .

[3] Earn an unqualified audit opinion[; 4] Keep administrative and program support costs below 11 percent of annual revenues and[; 5] Maintain a reasonable level of customer satisfaction, as measured by surveys, and maintain statistics on complaints

Id.

⁹⁵ Insider: Exclusive News for Trade and Program Allies, <http://www.energytrust.org/TA/insider/0705/index.html> (May/June 2007).

politically defined regional legal systems with their associated oversight and enforcement entities were formed to protect topographical features and their native species. However, the TRPA and the Columbia River Gorge Act are interstate compacts that represent anomalous responses to protection of a topographical feature that exists within the boundaries of two or more political jurisdictions. Sadly, such responses are anomalous because the likelihood of so many jurisdictions coming together and achieving ratification by the federal government is a remarkable achievement. More likely, jurisdictions will be occupied with in-fighting over the many details of how a shared topographical feature is to be protected.⁹⁶ Moreover, topographically-defined regions typically do not represent units that bear any on the ground relationships to combating global warming; although, of course, they are perfect units for adaptation to global-warming-caused consequences, as discussed in the following sections and later in this Article.⁹⁷ Accordingly, for the purposes of this Article, topographically-defined regions will be treated as a subset of politically-defined regions in the context of regional responses to global warming and will be given only minimal discussion within the context of the following section addressing ecosystem level regionalism.

3. *Ecosystem*

Ecosystems are closely related to topographical regions. Topography, including its associated climate, usually plays a dominant role in determining the inhabitants of an ecosystem, their particular characteristics, and their inter-relationships. An ecosystem, as used herein, is a community of plants and animals that, by reason of co-evolution and species invasion, coexist in a relatively fixed location and in relatively stable proportionate numbers. The species in a given ecosystem also interact in various ways, including, but not limited to, prey and predator, plant and pollinator, and nest builder and nest occupier.

⁹⁶ While most jurisdictions would not mind going on record as seeking the best way to “protect” a topographically defined area, these same jurisdictions may, in reality, be more interested in discovering the best way to “exploit” those resources.

⁹⁷ As will be explained in greater detail in later sections of this Article, the term “adaptation” used herein refers to the preservation of natural planetary systems which provide essential services to humanity and which, by virtue of their previous destruction at our hands, are at a premium today.

Because ecosystems, like topographical regions, typically cross jurisdictional boundaries, the agreement and cooperation of multiple governmental entities may be needed to protect them. Also, ecosystem-defined regions, like topographically-defined regions, lend themselves far better to adaptation measures to global warming than to preventative measures. One critical exception to this rule is earth's store of remaining intact global forests. Because trees and other plant species found in functioning forests provide a substantial and critical means for sequestering and storing carbon dioxide, forest-based regions (e.g., the boreal forests) deserve our utmost efforts in protection for prevention, adaptation, and humanity reasons. This is all the more true given the unfortunate practice of forests being destroyed, most notably by burning, which releases great stores of carbon dioxide into the atmosphere.⁹⁸ The following brief discussions of ecosystem-based regionalism represent instructive examples of this relatively underused form of combating global warming.

a. Continental Conservation

In the context of carbon emission reduction, continental conservation involves preventative measurements on the largest scale possible. Thus, continental-level preventative measures may affect entire continents, but more likely will affect large swaths of land on a continental scale. As in the case of topographically-defined regions and ecosystems, continental conservation measures face the problem of achieving cooperation among a number of jurisdictions. Indeed, continental-scale conservation efforts would, in most cases, involve more jurisdictions and encounter more problems than any of the regional units thus far discussed.

In addition to the contribution of continent-wide regional responses to prevention of GHG emissions, such regional responses could also play key roles in the adaptation to global warming. In terms of adaptation, continental conservation involves protecting species within entire ecosystems, including

⁹⁸ See Seth Borenstein, *Fires Billowed Out Greenhouse Gases*, LONG BEACH PRESS-TELEGRAM, Nov. 1, 2007, at 18A ("In one week, Southern California's wildfires spewed the same amount of carbon dioxide . . . as the state's power plants and vehicles did, scientists figure.").

very large ecosystems. Such protection may be attempted on an even larger scale if multiple major ecosystems and the migration corridors that link them are included. In a sophisticated and useful scientific work, the editors and authors of *Continental Conservation: Scientific Foundations of Regional Reserve Networks*, address a panoply of continent-wide conservation issues ranging from the role of scale in selecting and designing biological reserves, to the role of top carnivores in regulating reserves, and to the roles played by core areas, connectivity, and buffer zones.⁹⁹ Regarding climate change and continental conservation, several of the chapter authors note:

[T]he last ten years have produced increasing evidence that global climate change will present a major threat to the preservation of biodiversity. Certainly the habitat connectivity that permitted long-range movement of the species in response to previous global climate changes has been destroyed by anthropogenic habitat fragmentation. There is widespread uncertainty that even massive corridor systems would greatly ameliorate the impact of global warming, but many of those voicing doubts advocate establishing these corridors anyway.¹⁰⁰

As noted in the above quotation, because we are so close to so many tipping points in the earth's climate, we must proceed with all haste to take preventative measures, even in the face of some degree of reasonable uncertainty.¹⁰¹

Another way of expressing these ideas is that we must use regionalism to avoid "territories of chance."¹⁰² A territory of chance is left when a mostly linear and one-dimensional political boundary transects a natural topographical feature or ecosystem.¹⁰³ What is left is often a formerly unitary natural assemblage that has been destroyed, damaged, or diminished by the operation of two or more political regimes on a single

⁹⁹ THE WILDLANDS PROJECT, *CONTINENTAL CONSERVATION: SCIENTIFIC FOUNDATIONS OF REGIONAL RESERVE NETWORKS* (Michael E. Soulé & John Terborgh eds., 1999) [hereinafter *CONTINENTAL CONSERVATION*].

¹⁰⁰ Andy Dobson et al., *Connectivity: Maintaining Flows in Fragmented Landscapes*, in *CONTINENTAL CONSERVATION supra* note 99, at 154 (internal citations omitted).

¹⁰¹ See, e.g., PEARCE, *supra* note 8, at xxiv.

¹⁰² CHARLES C. CHESTER, *CONSERVATION ACROSS BORDERS: BIODIVERSITY IN AN INTERDEPENDENT WORLD* 2-3 (2006).

¹⁰³ *Id.* at 2.

natural unit.¹⁰⁴ To invoke all the methods of combating GHG and measuring their respective success, we must create trans-boundary regions that eliminate “territories of chance” and replace them with “a geography of hope.”¹⁰⁵

b. Four Continental MegaLinkages

Dave Foreman, director of the Rewilding Institute, a non-profit think tank based in Albuquerque, New Mexico, has dedicated himself to developing ideas, strategies, and visions of protected continental-scale ecosystems.¹⁰⁶ In his book *Rewilding North America*, Foreman proposes nothing less than the protection and restoration of what he describes as the “Four Continental MegaLinkages.”¹⁰⁷ These four megalinkages are diagrammed in the book, but some sense of their location may be discerned from their names and descriptions paraphrased as follows:

Pacific MegaLinkage: From the high mountains of northern Baja California up the southern Coast Range to the Sierra Nevada and Cascades, and then up the Coast Range of British Columbia into southern Alaska. *Spine of the Continent MegaLinkage:* From the volcanic cordillera of Central America up the Sierra Madre Occidental to the Rocky Mountains of the United States and Canada, then into the MacKenzie Mountains of the Yukon and across the Brooks Range of Alaska. *Atlantic MegaLinkage:* From the Everglades to Okefenokee, and then to the Appalachians (including the geologically distinct Adirondacks) into the Canadian Maritimes. *Arctic-Boreal MegaLinkage:* Northern North America from Alaska across to Quebec and Labrador with a dip down into the Upper Great Lakes.¹⁰⁸

In *Rewilding North America*, Foreman supports his concept of four continental megalinkages by basing them upon the six areas of recent ecological research: extinction dynamics,¹⁰⁹ island

¹⁰⁴ See *id.*

¹⁰⁵ *Id.* at 3 (quoting Wallace Stegner).

¹⁰⁶ See generally The Rewilding Institute, <http://www.rewilding.org/> (last visited Mar. 29, 2008).

¹⁰⁷ DAVE FOREMAN, *REWILDING NORTH AMERICA: A VISION FOR CONSERVATION IN THE 21ST CENTURY* 138 (2004).

¹⁰⁸ *Id.* at 138–39.

¹⁰⁹ *Id.* at 114 (explaining how extinction dynamics came out of the realization that we are living in the greatest mass extinction since the end of the dinosaurs; the

biogeography,¹¹⁰ metapopulation theory,¹¹¹ natural disturbance ecology,¹¹² top-down regulation by large carnivores,¹¹³ and landscape-scale ecological restoration. Foreman notes that he “brought together . . . the idea and scientific approach of *rewilding*, [which was] developed by Michael Soule in the mid-1990s.”¹¹⁴ One of the key differences between continental-scale rewilding and establishing smaller reserves is the role of corridors. In “traditional” corridor theory, core reserves are linked by relatively narrow corridors—i.e., small reserves are populated and their inhabitants disperse on a core-corridor-core basis.¹¹⁵ In Dave Foreman’s vision of continental megalinkages, core-corridor-core thinking is replaced with “general *landscape permeability* in which large core habitats are embedded.”¹¹⁶ This shift in how landscapes are viewed may be described as a shift between focusing on narrow corridors for species migration versus focusing on entire landscapes, with permeability varying by the needs of individual species and by the degree and type of landscape fragmentation found within a given migratory landscape (among other variables).¹¹⁷

scientific concern about mass extinctions launched the new scientific field of conservation biology, described as a “crisis discipline”).

¹¹⁰ *Id.* at 115–17 (explaining the island biogeography theory and its extensive application in ecological research).

¹¹¹ *Id.* at 117–18 (defining “metapopulation” as “a collection of subpopulations of the same species, each of which occupies a separate patch of a subdivided habitat” (internal quotation omitted)).

¹¹² *Id.* at 119 (explaining how natural disturbances such as fires, floods, and other extreme weather events “help maintain the natural mosaic of landscapes and natural vegetation types”).

¹¹³ *Id.* at 119–24 (explaining that while metapopulation dynamics and island biogeography theory were being applied to conservation area design, biologists were beginning to understand the value of large carnivores to all sorts of ecosystems and noting that recent field research demonstrates that “ecosystem integrity is often dependent on the functional presence of large carnivores”); *see also* LARGE CARNIVORES AND THE CONSERVATION OF BIODIVERSITY (Justina C. Ray et al. eds., 2005).

¹¹⁴ FOREMAN, *supra* note 107, at 128.

¹¹⁵ *See, e.g.*, JODI A. HILTY ET AL., CORRIDOR ECOLOGY: THE SCIENCE AND PRACTICE OF LINKING LANDSCAPES FOR BIODIVERSITY CONSERVATION (2006); DEFENDERS OF WILDLIFE, LANDSCAPE LINKAGES AND BIODIVERSITY (Wendy E. Hudson ed., 1991).

¹¹⁶ FOREMAN, *supra* note 107, at 134.

¹¹⁷ *See id.* at 134–35.

4. *Species*

Almost all that has been said above regarding topographical and ecosystem-defined regions can be said about regions built around the preservation and protection of a single species. However, species-based regions are less likely to involve the concomitant preservation of forests, which are a major carbon sink.¹¹⁸ Species-based regionalism provides a nice segue to an intellectually interesting flip side of ecosystem and species-based anti-global warming measures. In other words, while such regions can advance our efforts to combat global warming, the inverse is also true: combating global warming can likewise advance our efforts to preserve and protect both ecosystems and species. It is likely that the continued existence of most ecosystems and species depend upon the rapid deployment and imminent success of humanity's GHG combating measures. Such an intimate and profound reciprocity between the protector and the protected has likely never before existed on earth. The import of such a realization is manifold, but perhaps one most easily grasped is that from this moment onward we must learn to both tread lightly and act mightily to keep climate stabilizing elements and climate itself intact.

D. Measuring the Success of Specific Regional Approaches

1. Prevention, Adaptation, and Humanity

The purpose of this Article is to establish a framework for describing and assessing regional anti-global warming approaches. The beginnings of that framework are set forth in the sections below and implicate three basic criteria: (1) the degree to which the regional action prevents global warming by reducing GHG emissions and/or by sequestering and storing carbon ("prevention"); (2) whether the regional action includes a component that protects natural resources and natural services regardless of the cause of threat ("adaptation"); and (3) whether the regional action adequately protects humanity from the

¹¹⁸ See generally FRED WILLIAM ALLENDORF & GORDON LUIKART, CONSERVATION AND THE GENETICS OF POPULATIONS (2006) (offering highly technical analysis on species conservation, including everything from effective population size to metapopulations and fragmentation).

coming crises (“humanity”).¹¹⁹ These three criteria—prevention, adaptation, and humanity—form a basic litmus test for any regional system. They must reduce GHG emissions by precisely the amount and precisely within the time-frames specified by our best scientific consensus. There can be no “too little, too late” response to climate crisis.

2. *The “Who, When, and How Test”*

Within the frames of reference described above, there is one more critical level of analysis, namely the “Who, When, and How Test.” It is only by applying this finer gradation that we can begin to make accurate judgments of how well global warming-driven agreements, pacts, laws, and regulations will work.

Using the Who, When, and How Test, one might analyze a new statute that purports to set standards for GHG emission reduction, for example, Oregon’s Climate Change Integration Act of 2007 (Integration Act).¹²⁰ Having the policy spelled out in terms of standards, as does the Integration Act, certainly seems like a step in the right direction. However, applying the Who, When, and How Test may lead to the conclusion that more is needed.

Starting with the Who test, we see that the Integration Act creates a “Global Warming Advisory Commission”¹²¹ and a “Climate Change Research Institute.”¹²² Thus, on the surface at least, it appears that the Act passes the Who test. Just who is ultimately appointed to these bodies and what those appointees do once in a decision-making capacity may actually weaken the Act. Likewise, while the Act may establish time frames, usually in ten-year increments, it says little about how rapidly progress should be made within those broader time frames.¹²³ Because time is of the essence in every last effort to mitigate global

¹¹⁹ Cf. Joel Scheraga, *Foreword* to REGIONAL CLIMATE CHANGE AND VARIABILITY: IMPACTS AND RESPONSES xviii–xix (Matthias Ruth et al. eds., 2006) (noting that there are two approaches for dealing with climate change: mitigation and adaptation).

¹²⁰ H.R. 3543, 2007 Leg., Reg. Sess. (Or. 2007) (engrossed).

¹²¹ OR. REV. STAT. §§ 468A.200–.260 (2007).

¹²² *Id.* § 352.247.

¹²³ *See id.* § 468A.205.

warming, this lack of specificity regarding timing may represent a failure of the When test. There is also a big problem with the How test. Nowhere in the Integration Act does it say how the reductions will be made. While the Act establishes a “Global Warming Advisory Commission” and a “Climate Change Research Institute,” it vests neither of these entities with any regulatory authority and furthermore appears either not to fund them or to fund them marginally. While these entities may eventually come up with the How of reducing GHG emissions to meet the stated goals, such answers may arrive too late.

It should be noted that, even where a law passes the Who test, in that it identifies a responsible entity or task force, there can be de facto failure of the test if the responsible entity (usually an agency) or task force fails to implement the law fully. This circumstance normally occurs when an agency is specifically charged with implementing a law but the agency is not provided the resources or authority to do so. On the other hand, an agency may be vested with such broad rule-making powers that it may ultimately come to possess nearly unfettered discretion. Under such a scenario, an agency often becomes more powerful and has more control over particular outcomes than the legislature, particularly in light of the broad discretion courts usually give agencies. In this case, resources, authority, and discretion can easily become global warming negatives. Political leaders may come and go, but agency personnel will most often retain their positions through multiple administrations. Once entrenched in their jobs, such agency personnel may develop great power, but then use that power to maintain their own positions rather than bravely striking out to implement the true intent of the law. As can be readily imagined, the Who test may be the most important factor in any analysis of how a bill will work.

III

PREVENTION: REDUCTION IN GREENHOUSE GAS EMISSIONS

A. *Carbon Math Redux*

As explained above, the Union of Concerned Scientists has given humanity two years to *act* to avoid even a two degree Celsius increase (3.6 degrees Fahrenheit) in global

temperature.¹²⁴ This two-year period does not take into consideration discussions, arguments, committees, negotiations, collaborations, or any of the other bureaucratic obstacles to action. The two-year window of opportunity is to act, and to act decisively and urgently.

Scientists previously thought that humanity had up to 10 years to cap emissions. The accelerated melting of the polar ice caps has caused scientists to re-evaluate the time-frame in which society must act. Recently, scientists developed a prescription for carbon reduction that sets a two-year time frame for capping emissions in developing nations.¹²⁵ It may be that we will end up with even less time to act. Because of increased awareness of global warming and its consequences, there are many more eyes on the global warming problem areas, such as specific feedback loops. As individual and discrete feedback loops reach their trigger points, this information will be quickly factored into scientific estimations of how much time society has left to accomplish certain goals.¹²⁶

In short, the planet's climate scientists will collect new global warming data, which they will use to modify their predictions of time frames and/or global warming deadlines. Carbon math will likely change in response to new data. As the carbon math changes, one must assume that various action plans based on the previous carbon math will have to change also. In other words, we must monitor changes in carbon math and be prepared to respond to them. This is the essence of adaptive management.

B. The Climate Prescription

In a recent report, the Union of Concerned Scientists summarized the carbon reduction needed for the United States: (1) cap emissions by 2010; (2) reduce emissions by 4% each year

¹²⁴ See Union of Concerned Scientists, *supra* note 22.

¹²⁵ *Id.*

¹²⁶ Increases in the number and intensity of operant global warming feedback loops will each likely trigger even more feedback loops. One can think of the serial triggering of multiple feedback loops as a causal chain of giant dominos. As frightening as this scenario is, there is a more threatening scenario. Namely, there may be no reason to arbitrarily characterize what appears to be the operation of a feedback loop as a single event (or single domino to use the analogy above). Instead, one can imagine the planet as one enormous feedback loop, which, when triggered, cannot be reset except by the passage of geologic time.

thereafter; and (3) achieve 80% reduction below 2000 levels by 2050 to avoid the most catastrophic consequences of global warming.¹²⁷ Professor Mary Christina Wood notes that this prescription becomes a climate imperative inherent to each body of government, at each jurisdictional level.¹²⁸ As she notes, there can be no “orphan shares” in carbon reduction.¹²⁹ She describes the scientific imperative as the quantitative parameters of each jurisdiction’s fiduciary obligation to protect the atmosphere, or stated another way, each jurisdiction’s proportionate liability to clean up the atmosphere.¹³⁰ Governments will need to arrive at a standard way of measuring carbon in order to carry out this responsibility.

C. Standardizing Reporting

For any GHG prevention regime to work, it must incorporate a system with which to standardize reporting, an endeavor which presents significant challenges. The first challenge is fairly obvious: as global warming involves every society and nation on earth, which, in turn, have their own measurement systems, we must somehow reach a global consensus on the unit of measurement, be it tons, metric tons, parts per million, parts per billion, Celsius or Fahrenheit. Assuming that a substantial number of stakeholders agree upon a reporting unit, there remains the issue of to whom these measurements will be reported. Report-receiving entities may be specially created for the task, and they may be government agencies or other entities not yet envisioned. The entity chosen will depend upon the geographic scope of the area to be measured. For example, a state-wide program will likely involve reporting to a state agency. A regional program would likely have its own clearinghouse or reporting nexus. Again, as noted above, the California Climate Action Registry, the Climate Registry, the Climate Trust, the Energy Trust and other like entities are

¹²⁷ Union of Concerned Scientists, A Target for U.S. Emissions Reductions, *supra* note 22.

¹²⁸ Mary Christina Wood, *Government’s Atmospheric Trust Responsibility*, 22 J. ENVTL. L. & LITIG. 369, 377 (2007).

¹²⁹ *Id.* at 376.

¹³⁰ *Id.* at 377.

already working on reporting procedures. One can also find guidance in the Kyoto Protocol itself regarding these issues.¹³¹

D. Compliance Methodologies

The crux of compliance is timing. Failure to meet naturally imposed deadlines may result in consequences as dire as if GHG reduction had not been attempted at all. Greatly complicating matters is the fact that humanity is dealing with multiple tipping points; none of which carry scientific precision, and more of which are being postulated every day.¹³² One of the most obvious, and temporally near at hand, is the ice sheet tipping point.¹³³ Heating dynamics will also push the northern flora and fauna to their own tipping points.¹³⁴ We face not only atmospheric global warming tipping points, but tipping points for earth's natural features (e.g., glaciers), and for literally all creatures as we know them today. All of humanity's efforts to reduce GHG emissions are conducted against a backdrop of interrelated tipping points that, like a string of dominoes placed around the world, will be impossible to stop once started. Timing is everything.

1. Carbon Offsets

The three compliance methodologies set forth in the following sections represent the most commonly used methodologies as of the date of this Article. Starting with carbon offsets, they are discussed in order of effectiveness, with carbon offsets representing the least effective and carbon taxes representing the most effective.

In assessing the effectiveness of carbon offsets, a key factor to keep in mind is that the offsets need not, and usually do not, bear any direct relationship to the carbon emissions being offset. In other words, a carbon offset in no way means that an entity

¹³¹ See generally DEBORAH STOWELL, CLIMATE TRADING: DEVELOPMENT OF GREENHOUSE GAS MARKETS 194–210 (2005) (comprehensively discussing market driven anti-greenhouse gas schemes).

¹³² See PEARCE, *supra* note 8, at xxiv.

¹³³ Appenzeller, *supra* note 9, at 56–64; Paul Nicklen, *Vanishing Sea Ice: Life at the Edge*, NAT'L GEOGRAPHIC, June 2007, at 32–55.

¹³⁴ See, e.g., KOLBERT, *supra* note 5; WILDLIFE RESPONSES TO CLIMATE CHANGE: NORTH AMERICAN CASE STUDIES (Stephen H. Schneider & Terry L. Root eds., 2002).

will reduce its own carbon emissions. For example, a carbon-emitting entity such as a cement plant, an electrical power plant, or an airline may purchase carbon offsets, but these offsets in no way reflect a reduction of carbon emissions by their purchasers. Instead, carbon offsets typically represent the purchase of carbon sequestration credits from avoided deforestation (e.g., from the implementation of a conservation easement on forested land that, but for the easement, would be slated for development), from tree planting (technically known as “afforestation”) or from an entity instituting forest management for carbon sequestration.

Another important aspect of carbon offset programs is that they are voluntary. A successful offset transaction can be considered the result of what is essentially a voluntary agreement that the harms caused by the carbon emissions of an entity will be neutralized or counteracted by the purchase of offsets.

The existence of standardizing and reporting institutions enable carbon emitting entities to quantify both their emissions and the offsets proffered by another presumably non-carbon emitting entity. Because the purchase of an offset does absolutely nothing to reduce or eliminate the actual emissions of the carbon emitting entity, in the absence of governmental control, the purchase of carbon offsets represent a market decision to expend a certain amount of monetary capital in return for having conferred some other environmental or social benefit on humanity. Thus, the actual product represented by an offset purchase may be positive public relations, a footing for arguments against the need for governmental regulation, or perhaps, true concern about global warming.

An additional attraction to the purchase of carbon offsets is that they often come with co-benefits. For example, if the purchase of a carbon offset results in avoided deforestation, the preservation of the forest may also allow the forest to continue to provide wildlife habitat and other environmental services in addition to carbon sequestration. In a typical carbon offset purchase-and-sale agreement, the carbon offset purchaser will specify that it is entitled to the public relations rights for

engaging in whatever environmentally correct co-benefits are achieved by its purchase of carbon offsets.¹³⁵

However, great care must be taken to ensure that funds from an offset program must never be used to pay for anti-global warming measures that would otherwise occur regardless of the funding from the sources just described. One way to prevent the expenditure of carbon offset funding for pre-existing or already funded projects is to require that any carbon offsets demonstrate “additionality.” Requiring additionality means that any anti-global warming program for which funding from offsets are used would not have taken place *but for* the offsets program.¹³⁶

To the extent that the funding from the purchaser of a carbon offset confers a scientifically verifiable environmental benefit that offsets an equal portion of the purchaser’s carbon emissions, voluntary offsets may be a good thing. On the other hand, because carbon offsets do nothing to reduce the purchasing entity’s own carbon emissions, to the extent that they fail to confer a truly equal, beneficial offset, they may actually have no real effect in combating global warming. Indeed, some critics of carbon offsets have characterized them as resembling nothing more than the modern environmental equivalent of Roman Catholic indulgences of the sixteenth century, which allowed sinners to buy their way out of purgatory or otherwise to avoid the consequences of their sins by the payment of alms to the Catholic Church.¹³⁷

2. *Cap-and-Trade System*

While carbon offset programs are voluntary by nature, cap-and-trade programs tend to be governmentally regulated and mandatory. At its most basic level, a cap-and-trade system applies to a particular category of activity or industry that emits

¹³⁵ For example, the author is aware of carbon offset purchase and sale agreements in which the exclusive right to use co-benefits for public relations purposes is expressly reserved to one party to the contract.

¹³⁶ See The Climate Trust, 2005 RFP: Additionality & Baseline Guidance, http://www.climatetrust.org/solicitations_2005_Additionality.php (last visited Apr. 8, 2008); see also VOLUNTARY CARBON MARKETS: AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK (Ricardo Bayon et al. eds., 2007).

¹³⁷ Cf. Jeffrey Ball, *Setting New Carbon Standards*, WALL ST. J., Nov. 19, 2007, at A4 (referring to carbon offsets as “passes”).

greenhouse gases. Using monitoring equipment, the current level of emissions is determined. This actual level of emissions is compared to an absolute “safe” level developed using carbon math. The result of this analysis is to determine a collective level of emissions that will allow the sector in question to meet its share of the GHG reductions. This level is further divided among the stakeholders. Once this artificial market is created, those stakeholders that are unable to reduce their emissions to the specified level may buy credits from those stakeholders whose emissions fall below the standard applicable to them. The benefits of this system are that it should not force any stakeholder out of business; it is reasonably transparent and relatively easy to implement and monitor. The downside of any cap-and-trade system is that, to the degree that the ultimate allowable degradation is closer to the currently existing degree of degradation, it fairly may be argued that all the cap-and-trade system does is legalize pollution.¹³⁸

3. Carbon Tax

Another tool is a carbon tax. The first questions that come to mind regarding a carbon tax are who gets taxed and for what. Every activity that generates a greenhouse gas could, and arguably should, be taxed in some way. As we currently live in a society that taxes almost everything imaginable, the technological and practical aspects of an all-encompassing carbon tax would seem to be quite manageable. Another question that arises is how the revenues from such taxes would be used, which is where the complexity creeps in. Certainly, some of the revenues would be directed towards research efforts to find alternatives to fossil fuels. Funding public outreach, subsidies for hybrid vehicles, and other energy efficient products come to mind. Funds could also be spent on mitigation and remediation measures to help heal and preserve natural systems. Some amount of the revenues of a carbon tax should be used to offset the higher renewable energy costs of those people living at or near poverty level for whom a carbon tax could have disastrous financial consequences. A carbon tax is seemingly a

¹³⁸ Jürgen Lefevere, *The EU Greenhouse Gas Emission Allowance Trading Scheme*, in CLIMATE CHANGE AND CARBON MARKETS: A HANDBOOK OF EMISSIONS REDUCTION MECHANISMS 75, 93 (Farhana Yamin ed., 2006).

better fix than cap-and-trade programs because it can reach across all sectors and can be used with much more flexibility not only to generate revenues but to achieve policy goals such as switching traditional fossil fuel driven activities to renewable energy.¹³⁹

IV

ADAPTATION: PROTECTING REMAINING ENVIRONMENTAL SERVICES

A. *The Need for Adaptation*

As previously noted, adaptation as used in this Article does not refer to human adaptation to the potentially gruesome consequences of unchecked global warming. Rather, adaptation refers to our human efforts to preserve nature, so that it can continue to provide crucial services that will become even more essential as global warming progresses. These services include clean water, productive topsoil, and seed strains for harvestable food plants. Adaptation necessarily involves the prevention of activity that disturbs soil, rocks, minerals, streams, rivers, lakes, and oceans, because these resources are now more valuable for the benefits they provide to humanity than for quick profit to individuals or corporations. Adaptation requires protecting biodiversity, a resource crucial to human survival.

Exploring the range of environmental services provided by nature reveals the necessity of preserving natural resources in order to have any hope of continuing life as we know it in the face of climate upheaval. While environmental services are innumerable, some obvious ones give an idea of their importance to the welfare of humanity.

One vital natural service is precipitation. The movement of billions of gallons of freshwater to otherwise parched areas enables other natural systems to flourish and allows humanity to irrigate its crops and have water with which to drink and wash. Other services may be more subtle, but no less powerful or important to humanity. For example, the great currents in the

¹³⁹ See generally Dan Rosenblum & Charles Komanoff, *Carbon: Tax Not Cap-and-Trade*, TIKKUN, July–Aug. 2007, at 52 (comparing cap-and-trade and carbon tax systems to reduce global greenhouse gas emissions); STOWELL *supra* note 131, at 83 (listing countries taxing carbon dioxide emissions).

world's oceans move billions of gallons of water over great distances. One such current, the Gulf Stream, moves warm equatorial water northward where it warms northern Europe, preventing the major civilizations that flourish there from entering into an ice age.¹⁴⁰

Another vital service, described in detail by Elizabeth Kolbert, is pollination, which currently is threatened with the widespread phenomenon of "colony-collapse disorder."¹⁴¹ The principal symptom of this disorder is quite simple and extremely alarming: when beekeepers open their hives to check on their winged wards and the honey the bees are producing, they find not the usual swarms of miniature industrialists but only an empty hive.¹⁴² As of yet, scientists have not determined the cause for this bizarre malaise.

The most obvious service of bees is making honey, without which we could probably imagine a world. However, we greatly depend upon other pollination services provided by bees. There are many types of bees, but the species most used by bee keepers in North America is *Apis mellifera*, which Kolbert describes as a "floral generalist."¹⁴³ The technical name for this trait is "polylectic," which means that this species will feed upon just about any blooming plant.¹⁴⁴

Because polylectic honeybees pick up minute pieces of pollen as they move from plant to plant in search of food, many plants have come to rely on honeybees for pollination.¹⁴⁵ As noted by Kolbert, a loss in services from honeybees would wither yields of crops from kiwis to avocados.¹⁴⁶ In fact, so useful and necessary are honeybees to the pollination of plants, especially to cultivated monocultures in today's mega-farms, that each year bee keepers literally rent the services of their bees by setting up their hives near one food crop and then moving on to the next

¹⁴⁰ GODREJ, *supra* note 5, at 24.

¹⁴¹ Elizabeth Kolbert, *Stung: Where Have All the Bees Gone?*, THE NEW YORKER, Aug. 6, 2007, at 52 [hereinafter *Stung*]; see also KOLBERT, *supra* note 5; GRETCHEN C. DAILY & KATHERINE ELLISON, THE NEW ECONOMY OF NATURE: THE QUEST TO MAKE CONSERVATION PROFITABLE (2002).

¹⁴² *Stung*, *supra* note 141, at 52.

¹⁴³ *Id.*

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.*

crop needing pollination until the season is over.¹⁴⁷ Among the commercial crops requiring the services of honeybees are apples, blueberries, cranberries, cherries, cucumbers, watermelons, cantaloupes, pumpkins and most of all, almonds.¹⁴⁸

Humanity and civilization can only survive and flourish in a world in which natural systems are sufficiently intact and stable so as to provide the services and the goods that line the shelves of stores and supermarkets worldwide. Global warming threatens the very existence of such natural systems.¹⁴⁹ In this new era of climate uncertainty, policy makers should eliminate human-caused threats to these systems as much as possible.

B. The Causes of Biodiversity Loss

Biodiversity plays a key role in all life on the planet. The greatest threat to biodiversity is the extinction of species. As biologist Edward O. Wilson explains, conservation biologists have devised an acronym to describe how humanity “drives a species down” to extinction: “HIPPO.”¹⁵⁰ HIPPO stands for Habitat destruction, Invasive species, Pollution, Population (i.e., human population), and Overharvesting.¹⁵¹ Currently, the “prime mover of the incursive forces around the world” is the second P, human population.¹⁵² Because of the premium virtually all natural resources carry in light of climate uncertainty, policymakers must have a general understanding of how biodiversity is destroyed in order to make decisions that will promote, rather than harm, public welfare in the years ahead. While all the components of “HIPPO” are extremely important, the harmful effects of out-of-control population growth and overharvesting are generally well known and understood and thus need little discussion here. Likewise, the pollution factor is limited in this Article to pollution by greenhouse gases, as

¹⁴⁷ *Id.*

¹⁴⁸ *Id.*; see also MATTHEW SHEPHERD ET AL., POLLINATOR CONSERVATION HANDBOOK (2003); STEPHEN L. BUCHMANN & GARY PAUL NABHAN, THE FORGOTTEN POLLINATORS (1996).

¹⁴⁹ See generally CLIMATE CHANGE AND BIODIVERSITY (Thomas E. Lovejoy & Lee Hannah eds., 2004).

¹⁵⁰ EDWARD O. WILSON, THE FUTURE OF LIFE 50 (2002).

¹⁵¹ *Id.*

¹⁵² *Id.*

previously discussed. Accordingly, the following sections selectively focus on how the loss of habitat, phenological changes and the presence of invasive species can contribute to the loss of biodiversity.

1. The Loss of Unique DNA

One of the first effects of the loss of natural habitat by anthropogenic causes is a reduction in the number and type of indigenous species. Consequently, a species embattled by HIPPO faces a genetic time bomb known as inbreeding depression.¹⁵³ Inbreeding depression occurs as smaller and smaller populations result in the mating of increasing numbers of related individuals such as siblings and first cousins.¹⁵⁴ As the frequency of inbreeding increases, so does the percentage of the population with double doses of defective genes that may cause sterility and death.¹⁵⁵

Another way in which rarity feeds back into a system and further reduces its constituents is the increase in the relative degree of random fluctuation of populations.¹⁵⁶ Thus, in an already-stressed population, the overall number of individuals can decrease to a point referred to by mathematicians as the “absorbing barrier.”¹⁵⁷ In terms of the species so affected, a population drop can land the species in the realm of no return; i.e., their number of individuals is zero.¹⁵⁸ Once a population has been sufficiently reduced, it can lack the resilience to bounce back from natural and unnatural disasters, such as extreme weather events, flooding and fire.¹⁵⁹

As explained above, the habitat element of HIPPO, plays a powerful force in species and biodiversity survival. As explained by Edward O. Wilson:

The loss of forest during the past half-century is one of the most profound and rapid environmental changes in the history

¹⁵³ *Id.* at 56.

¹⁵⁴ *Id.*; see also EDWARD O. WILSON, *CONSILIENCE: THE UNITY OF KNOWLEDGE* 189 (1998).

¹⁵⁵ WILSON, *supra* note 150, at 56.

¹⁵⁶ *Id.* at 57.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

of the planet. Its impact on biodiversity is automatic and severe. To reduce the area of a habitat is to lower the number of species that can live sustainably within it.

... [T]he number of natural habitats reduced to fragments
... is increasing rapidly all around the world.¹⁶⁰

Humans have drastically reduced nature's abundance and resilience by developing an enormous amount of land over the past one hundred years in this country. We have left isolated bio-islands that are sometimes so remote from food and genetic resources that they are, essentially, death rows for their stranded inhabitants.

2. *The Uncoupling of Nature, Phenology, and Conservation Biology*

Another category of destruction and loss involves the severance of natural symbiotic relationships fine-tuned by evolution. To appreciate this type of loss, an understanding of several concepts is necessary. The first is that of seasonality, which refers to the annual changes in the patterns of temperature, precipitation, and the length of daylight and of darkness for every given spot on the planet.¹⁶¹ These seasonal changes trigger, sustain, and conclude a myriad of biological changes at all levels of the earth's species. While no one would dispute these statements, there is much anticipation and dread regarding how global warming and climate change will affect seasonality and the biological changes that are driven by seasonality.

The second critical piece of information is that there is already a scientific field with a large body of research that addresses these issues: phenology. The term phenology is derived from the Greek word *phaino*, meaning to show or appear.¹⁶² Phenology "is the study of periodic biological events in the animal and plant world as influenced by the environment, especially temperature changes driven by weather and climate."¹⁶³

¹⁶⁰ *Id.* at 58–59.

¹⁶¹ Mark D. Schwartz, *Introduction to PHENOLOGY: AN INTEGRATIVE ENVIRONMENTAL SCIENCE 3* (Mark D. Schwartz ed., 2003).

¹⁶² *Id.*

¹⁶³ *Id.*

The third concept is that of de-synchrony or the uncoupling of natural systems as a result of phenological changes.¹⁶⁴ To put it quite simply, human-caused climate change will play havoc with the seasonally generated behaviors of most species. Earlier springs will trigger earlier migrations of some species and also might trigger earlier ends to the hibernation phases of various species. The problem is that each species will change in its own way. Thus, wherever one or more species is dependent on the seasonal changes of one or more other species, the symbiotic relationship necessary to survival collapses. For example, bears might awaken from hibernation before the fruit that has always awaited them in the past has had time to form. Predator-prey relationships will also be ripped apart as species that normally were active at the same time of the year now occupy different temporal zones.

Phenological changes will also disrupt the relationships of co-evolved species by sending some of them on forced migrations to find cooler climes. Just as the lines on a topographical map represent areas of the same altitude, so do the lines on an isothermic map represent areas of the same climate. These isotherm-chasing migrations will typically be northward or, in mountainous areas, to higher elevations. The problem is that such migrations will be differential. Some co-evolved species will stay at home while others will leave. To the extent that these species relied on each other for food, pollination, the control of predator species, or the control by predator species of other species competing for the same food or territory, the ecosystems they constituted will become uncoupled, de-synchronized, and utterly torn apart.¹⁶⁵

¹⁶⁴ *Id.*

¹⁶⁵ The science dealing with these relationships is “conservation biology,” which unites “traditionally academic disciplines such as population biology and genetics with the applied traditions of wildlife, fisheries, and land management and allied fields.” See MARTHA J. GROOM ET AL., *PRINCIPLES OF CONSERVATION BIOLOGY* CH. 1 (3d ed. 2006); see also PHILOSOPHY AND BIODIVERSITY (Markku Oksanen & Juhani Pietarinen eds., 2004); MALCOLM L. HUNTER, JR., *FUNDAMENTALS OF CONSERVATION BIOLOGY* (2d ed. 2002); RICHARD B. PRIMACK, *ESSENTIALS OF CONSERVATION BIOLOGY* (3d ed. 2002); SHEILA PECK, *PLANNING FOR BIODIVERSITY: ISSUES AND EXAMPLES* (1998). Just as conservation biology is a study in biodiversity loss, it is also an applied science of finding solutions to ecological problems. It behooves policymakers to bring the conservation biologists to the forefront just as they have with the climate scientists.

3. *Increases in Invasive Species and Ecosystem Disruption*

As average climate temperatures increase, plants and animals will tend to migrate northward, or if in mountainous climes, upward. These creatures thus become invasive species in their new homes. Perhaps they will not survive in their new climes and will wink out of existence. They may thrive and prosper, out-competing and displacing the true native species. Back in their former climes, the migration of a species may create an ecological niche just perfect for another climate-surfing species. Thus, in a worst case scenario, climate change-driven migrations will result in a double-dose of invasive species—those moving north, becoming invasive species in new areas, and their replacements invading the niche left by the early migrators. Unfortunately, there is another trigger for non-native species' invasions, namely any kind of disturbance to the existing ecosystem. Thus, extreme weather events,¹⁶⁶ the migrations of large numbers of displaced people, the continued rampant development of every part of the planet, and the like can create ecological niches into which invasive species will find their way.

V

HUMANITY: PROTECTING HEALTH, SAFETY, AND WELFARE

The third test of an anti-global warming strategy, system, or regime is its ability to protect humanity against the disastrous events that come with climate upheaval—events such as flooding, famine, fire, heat waves, hurricanes, drought, disease, crop failure, and a myriad of other catastrophic conditions. Just as there is an enormous scientific consensus as to the existence and inevitability of global warming (the severity of which may depend upon the preeminent variable of the global collective response by humanity) and to the anthropogenic causes of global warming, so there is also enormous scientific consensus as to its impacts on humanity.¹⁶⁷

As the timing and the intensity of the seasons change, many of the staple food crops will become impossible to grow. Along with the changing length of the seasons, global warming will also

¹⁶⁶ See generally CHRIS MOONEY, *STORM WORLD: HURRICANES, POLITICS, AND THE BATTLE OVER GLOBAL WARMING* (2007).

¹⁶⁷ See, e.g., IPCC REPORT, *supra* note 1.

disrupt the hydrological cycles that we depend upon for a myriad of purposes, primarily to drink and to irrigate crops. Cultivated crops will thus be subject not only to changes in the timing of the growing season, but also to drought. There will be less food and more starving people. Where these starving people will go, no one yet knows, but few would deny that millions of starving people will be emigrating in search of areas with more food.

The well-documented upward trajectory of hot weather will also take a direct toll. Thousands of people have already died as a result of killer heat waves,¹⁶⁸ and that number will likely soar as temperatures rise.

As the glaciers and ice packs melt, oceans will rise. Scientists have already predicted the most likely areas where such rises in oceanic levels will cause flooding and permanent loss of land now used for habitation and food production. Many millions of people will be displaced by lack of food while many millions of others will be displaced by global warming-caused flooding. Currently there is no plan for locating the homeless when the homeless become legion. Consequently, one can only begin to imagine the unprecedented human misery that global warming will bring.

Against this backdrop of human suffering will be the suffering and extinction of many of the earth's creatures. As our collective actions destroy millions of creatures on earth, we will lose not only the services that we need to survive, but also the creatures upon which depend our mythologies, our cultures, and our very sense of who and what we are.

The looming scenarios are easily described. Loss of food sources causing mass hunger; inundation of shoreland and inland waters causing mass loss of living space; mass species extinctions causing incalculable loss of environmental services top the list. As the breakdown of each human system places additional stress on remaining systems, we will experience a domino effect of the loss of governmental, institutional, and social systems. Likewise, we should not expect our financial institutions and economies to survive intact. There will be economic disruption in various forms, including the scarcity of goods, an increase in

¹⁶⁸ GORE, *supra* note 4, at 75 (35,000 Europeans dead from 2003 heat wave).

bankruptcies, loss of value in investments and property, loss of home equity, and likely massive inflation.¹⁶⁹

Extreme weather events will be ever more common. As Hurricane Katrina demonstrated all too well, even the United States—long thought to be the world leader in resources, science, stable government, and emergency preparedness—is woefully vulnerable to catastrophic events. The nation's inability to deal with Katrina presented itself at each level of government, across multiple agencies and culminating with the President's Office.

While regionalism could provide additional protection against these foreseeable natural disasters and conditions, there is currently little being done to prepare for the future.

VI

OREGON: A CASE STUDY IN POLITICAL REGIONALISM

The following sections focus on selected responses to global warming by the State of Oregon. Some of these responses are regional in the sense that they involve other political entities, most notably adjacent states, while other responses are regional in the sense that they are statewide.

A. *The Governor*

1. *Governor Kulongoski's Position on Greenhouse Gas Reductions*

Oregon's Governor Kulongoski identified global warming as a top priority issue at the beginning of his administration and has been working diligently ever since to move policy forward.¹⁷⁰ Governor Kulongoski sees global warming as one of the most pressing long-term issues facing Oregon, the nation, and the world.¹⁷¹ He has expressed a strong commitment to climate leadership.¹⁷²

¹⁶⁹ See, e.g., PETER S. HELLER, WHO WILL PAY? COPING WITH AGING SOCIETIES, CLIMATE CHANGE, AND OTHER LONG-TERM FISCAL CHALLENGES (2003).

¹⁷⁰ E-mail from David Van't Hof, Or. Governor's Office, to James L. Olmsted, Conservation & Preservation Counsel (July 17, 2007, 3:30 PST) (on file with author).

¹⁷¹ *Id.*

¹⁷² *Id.*

As part of this effort, Governor Kulongoski has joined a number of regional anti-global warming efforts including the West Coast Global Warming Initiative, which brought Oregon into partnership with California and Washington.¹⁷³ The leadership and success of the West Coast Global Warming Initiative caused it to expand into the Western Climate Initiative (WCI), which has added New Mexico, Arizona, and Utah to the original three states.¹⁷⁴ These five states have since been joined by British Columbia and Manitoba, making the Western Climate Initiative an international alliance.¹⁷⁵

Governor Kulongoski has expressed a commitment to developing and participating in a regional cap-and-trade system as called for in the WCI. The Governor also is exploring continued implementation of the Climate Change Integration Group report and recommendations as well as other concepts such as emission performance standards and low carbon fuel standards.¹⁷⁶ Among the key anti-global warming steps taken to-date are announcing emission reduction goals and adopting a clean cars program.¹⁷⁷

As this Article goes to press, Governor Kulongoski is gratified that after opposing his global warming efforts in prior sessions, in the 2007 session, the Oregon Legislature passed its first global

¹⁷³ *Id.*; see also Jeffrey Ball, *Governors of 3 West Coast States Join to Combat Global Warming*, WALL ST. J., Sept. 22, 2003.

¹⁷⁴ E-mail from David Van't Hof, *supra* note 170.

¹⁷⁵ *Id.*; see also Robert Tanner, *5 Western Governors Agree to Work Together on Greenhouse Gas Emissions*, SANTA FE NEW MEXICAN.COM, Feb. 26, 2007, <http://www.freewmexican.com/news/57591.html>; see also Press Release, Province of Man., Manitoba Newest Member of International Climate Change Initiative (June 12, 2007), available at <http://news.gov.mb.ca/news/index.html?archive=2007-06-01&item=1777> ("Manitoba has a climate change action plan that includes legislating Kyoto targets, setting a made-in-Manitoba vehicle standard, reducing emissions from our larger landfills, enshrining leading-edge green building and fleet standards and phasing out the last remaining coal-fired generation facility in the province.").

¹⁷⁶ E-mail from David Van't Hof, *supra* note 170; see also THE GOVERNOR'S CLIMATE CHANGE INTEGRATION GROUP, FINAL REPORT TO THE GOVERNOR: A FRAMEWORK FOR ADDRESSING RAPID CLIMATE CHANGE (2008), available at <http://oregon.gov/ENERGY/GBLWRM/docs/CCIGReport08Web.pdf>.

¹⁷⁷ E-mail from David Van't Hof, *supra* note 170.

warming legislation since 1997.¹⁷⁸ Among the global warming bills passed by the legislature in 2007 were those adopting Governor Kulongoski's previously announced goals and creating a permanent commission.¹⁷⁹ Governor Kulongoski hopes that in the next legislative session, lawmakers will have gained an understanding of the importance and urgency of global warming issues and be poised to pass even more ambitious anti-global warming legislation in the 2009 legislative session.¹⁸⁰

2. Oregon Strategy for Greenhouse Gas Reductions

The Oregon Strategy for Greenhouse Gas Reductions (Oregon Strategy) was published in 2004.¹⁸¹ It was collectively authored by the Governor's Advisory Group on Global Warming (Advisory Group), comprised of approximately twenty citizens and public officials representing a broad range of backgrounds and interest groups.¹⁸² The document itself is lengthy and detailed, and it sets an urgent tone.

A full analysis of the lengthy Oregon Strategy is beyond the scope of this survey of Oregon's responses to climate change. By way of a summary, the Strategy sets forth quantitative targets for greenhouse gas reduction in the state.¹⁸³ The strategy then sets forth a structure to achieve the goals, dividing the recommended actions into categories such as "Integrating Actions," "Energy Efficiency," "Biological Sequestration," and "State Government Operations."¹⁸⁴ The strategy assumes that legislative action is necessary to achieve the reduction goals.¹⁸⁵ Clearly, however,

¹⁷⁸ *Id.*; H.R. 3283, 69th Leg., Reg. Sess. (Or. 1997) (1997 marks the year the legislature passed the landmark requiring new energy plants to reduce or offset their carbon emissions).

¹⁷⁹ E-mail from David Van't Hof, *supra* note 170.

¹⁸⁰ *Id.*

¹⁸¹ GOVERNOR'S ADVISORY GROUP ON GLOBAL WARMING, OREGON STRATEGY FOR GREENHOUSE GAS REDUCTIONS (2004), available at <http://www.oregon.gov/ENERGY/GBLWRM/docs/GWReport-Final.pdf> [hereinafter OREGON STRATEGY].

¹⁸² *See id.* at vii.

¹⁸³ *Id.* at 8–9.

¹⁸⁴ *See id.* at pt. 2 § 2.

¹⁸⁵ *See id.* at vii ("Some recommendations emerged as state administrative actions, while others will still need legislative approval.").

some actions could be taken under the Governor's leadership without legislative involvement.

B. The Legislature

The 2007 Oregon legislative session was a watershed for passage of environmental laws. As described in the *Statesman Journal*, “[t]he 2007 legislative session marks the first time in about 30 years that the environment has played a prominent role in the state’s politics. Not since the era of former Gov[ernor] Tom McCall have so many major environmental priorities passed.”¹⁸⁶ State Senator Brad Avakian, a Democrat from Portland and member of the Senate Committee on Environment and Natural Resources, and State Representative Jackie Dingfelder, a Democrat from Portland and member of the House Committee on Energy and the Environment, were at the forefront of efforts to prioritize environmental legislation.¹⁸⁷ Avakian and Dingfelder both led environmental committees, and together, they worked on an environmental agenda before the session began.¹⁸⁸ When one considers that the previous legislative session in 2005 responded to global warming by passing a non-binding resolution that prohibited Oregon agencies from imposing requirements relating to the control of greenhouse gas emissions, the turn-around is truly amazing.¹⁸⁹

The following sections highlight and summarize selected global warming related legislation passed in Oregon with an emphasis on recent legislation from the 2007 session.¹⁹⁰

¹⁸⁶ Beth Casper, *Environmentalists Get Re-Energized for Throwback to the ‘Tom McCall Years’*, STATESMAN J., July 3, 2007, at 1.

¹⁸⁷ *Id.*

¹⁸⁸ *Id.*

¹⁸⁹ See H.R. Res. 3, 73d Leg., Reg. Sess. (Or. 2005).

¹⁹⁰ Among those energy bills passed during the 2007 legislative session but not discussed in this Article are the following: H.R. 3201, 74th Leg., Reg. Sess. (Or. 2007) (creating and enhancing energy reduction based tax credits for business and residential usage); H.R. 2565, 74th Leg., Reg. Sess. (Or. 2007) (relating to appliance efficiency standards); H.R. 2620, 74th Leg., Reg. Sess. (Or. 2007) (relating to solar energy in public buildings); H.R. 2628, 74th Leg., Reg. Sess. (Or. 2007) (relating to outdoor lighting brightness); H.R. 2925, 74th Leg., Reg. Sess. (Or. 2007) (relating to small wave energy facility lighting exemption); S. 375, 74th Leg., Reg. Sess. (Or. 2007) (appliance efficiency standards); S. 479, 74th Leg., Reg. Sess. (Or. 2007) (relating to light fixtures in schools); S. 814, 74th Leg., Reg. Sess. (Or. 2007)

1. *Facilities Siting Act of 1997 (H.B. 3283)*

In 1997, Oregon became the first state in the nation to respond to global warming by passing House Bill 3283.¹⁹¹ H.B. 3283 addressed GHG emissions from power plants by requiring all new power plants to reduce their GHG emissions by seventeen percent.¹⁹² This reduction could be achieved by paying carbon-offset funds to a non-profit entity that would use those funds to reduce atmospheric GHGs through various programs, such as carbon sequestration.¹⁹³

2. *Energy Efficiency Act of 2006 (H.B. 3363)*

One other pre-2007 law relating to global warming deserves mention, namely House Bill 3363, which was passed in the 2005 legislative session.¹⁹⁴ H.B. 3363 established energy efficiency standards for several appliances not regulated by federal law.¹⁹⁵ Among those products are commercial clothes washers, commercial ice makers, commercial refrigerators and freezers, external power supplies, torchiere lighting fixtures, commercial unit heaters, exit signs, metal halide lamps, reflector lamps, traffic signal modules, and pre-rinse spray valves.¹⁹⁶ Beginning in 2007, over the next three years, H.B. 3363 is expected to save “[seventy] gigawatt hours of electricity (enough to power 5,500 households for a year)[;] 172 billion BTUs of natural gas (enough to heat 2,400 households for a year)[; and] 259 million gallons of water (enough for 4,000 households for a year).”¹⁹⁷

(removing corn grain as an eligible feedstock from the biofuel producer tax credit and delaying the eligibility of wheat as a producer tax credit for two years).

¹⁹¹ See H.R. 3283, 69th Leg., Reg. Sess. (Or. 1997).

¹⁹² See OR. REV. STAT. § 469.503(2)(a) (2007).

¹⁹³ See *id.* § 469.503(2)(d); see also OR. ADMIN. R. 345-001-0000 to -0220, 345-024-0010 to -0720 (2007) (regulations promulgated by the Oregon Department of Energy, Energy Facility Siting Council). The non-profit entity that was formed to accept carbon offsets was originally called the Oregon Climate Trust but has since changed its name to the Climate Trust. See *supra* Part II.C.1.e.iii.

¹⁹⁴ H.R. 3363, 73d Leg., Reg. Sess. (Or. 2006).

¹⁹⁵ *Id.*; OR. REV. STAT. § 469.233 (2007).

¹⁹⁶ OR. REV. STAT. § 469.233.

¹⁹⁷ Oregon House Democrats, Higher Energy Efficiency Standards Good for Businesses and Consumers, http://www.oregonhousedemocrats.com/2005/06/higher_energy_e.html (last visited Mar. 29, 2008).

3. *Renewable Energy Portfolios (S.B. 838)*

On June 6, 2007, Governor Kulongoski signed into law S.B. 838. This landmark legislation requires large electricity producers in Oregon to meet twenty-five percent of their energy load with new renewable sources by 2025.¹⁹⁸ The bill also provides interim targets of five percent by 2011, fifteen percent by 2015 and twenty percent by 2020.¹⁹⁹ As Governor Kulongoski noted:

This bill is not the end—it's just the beginning of a much broader, sustained effort to reestablish—and maintain—Oregon as a leader in innovative environmental and energy policies that protect our quality of life, contribute to a robust economy and combat global warming.²⁰⁰

4. *Climate Change Integration Act of 2007 (H.B. 3543)*

House Bill 3543 represents another landmark in Oregon global warming legislation.²⁰¹ Known as the “Climate Change Integration Act,” the bill has three main components. The first of these components commits the state of Oregon to the GHG emission reduction standards first daylighted in the 2004 Oregon Strategy for Greenhouse Gas Reductions.²⁰² These goals are as follows: (1) by 2010, arrest the growth of Oregon’s GHG emissions and begin to reduce emissions; (2) by 2020, achieve a ten percent reduction below 1990 GHG levels; and (3) by 2050, achieve at least a seventy-five percent reduction below 1990 levels.²⁰³ The second component establishes an “Oregon Global Warming Commission.”²⁰⁴ This entity will track and evaluate ongoing measures to reduce global warming. The Commission will also be responsible for developing a global warming policy

¹⁹⁸ Press Release, Governor Ted Kulongoski, Governor Kulongoski Signs Renewable Portfolio Standard into Law (June 6, 2007), available at http://governor.oregon.gov/Gov/P2007/press_060607.shtml; see also OR. REV. STAT. ch. 469A (2007); S. 838, 74th Leg., Reg. Sess. (Or. 2007).

¹⁹⁹ OR. REV. STAT. § 469A.052(a).

²⁰⁰ Press Release, *supra* note 198 (emphasis in original).

²⁰¹ H.R. 3543, 74th Leg., Reg. Sess. (Or. 2007).

²⁰² See OREGON STRATEGY, *supra* note 181.

²⁰³ OR. REV. STAT. § 468A.205(1).

²⁰⁴ *Id.* §§ 468A.200–.260.

to be submitted to the state.²⁰⁵ Additionally, the Commission will develop outreach programs to educate Oregonians about global warming and steps they can take to reduce it.²⁰⁶ The third component is the formation of a “Climate Change Research Institute” to be administered by the Oregon University System.²⁰⁷ This body will provide technical expertise regarding global warming issues to the Commission and to state agencies and local governments.²⁰⁸ The Institute will also study the impacts of global warming on Oregonians and will develop responses to mitigate and/or adapt to global warming impacts.²⁰⁹

While H.B. 3543 appears to represent substantial progress toward the urgent goal of reducing GHGs sufficiently to mitigate some of the worst effects of global warming, it does have some troubling limitations. The first problem is that the goals may be too little too late. For example, taking ten years to achieve a mere ten percent reduction below 1990 GHG levels may be nothing more than “feel good” legislation, unsupported by science. A second, and even more serious, problem is that the GHG reduction goals in H.B. 3543 may be merely aspirational. The statutory provision setting forth the standards states that “[t]his section does not create any additional regulatory authority for an agency of the executive department.”²¹⁰ Finally, the bill allocates a mere \$180,000 in funding for the Oregon Climate Change Research Institute.²¹¹ If this is the sole source of funding for the Research Institute, the organization is deeply underfunded. If this is the case, it is sadly ironic that this crucial organization may lack the funding to do much more than rent an office and hold a few meetings.

5. Renewable Energy Act of 2007 (H.B. 2210)

House Bill 2210 is a lengthy and detailed biofuels measure.²¹² H.B. 2210 has been heralded by the Oregon Environmental

²⁰⁵ *Id.* § 468A.240.

²⁰⁶ *Id.* § 468A.245.

²⁰⁷ *Id.* § 352.247.

²⁰⁸ *Id.*

²⁰⁹ *Id.*

²¹⁰ *Id.* § 468A.205(3).

²¹¹ H.R. 3543, 74th Leg., Reg. Sess. § 16 (Or. 2007).

²¹² H.R. 2210, 74th Leg., Reg. Sess. (Or. 2007).

Council as “creat[ing] opportunities for Oregon farmers, expand[ing] markets for Oregon biofuels and establish[ing] a sustainable, regional model for biofuels production.”²¹³ While politically touted as “win-win” legislation, biofuels measures have been solidly criticized.²¹⁴

H.B. 2210 mandates a phased program of blending Oregon-produced biodiesel into diesel sold in Oregon with a companion mandate of blending Oregon-produced ethanol with gasoline sold in Oregon.²¹⁵ In addition to creating a market for Oregon products, which may be used in biofuels, H.B. 2210 also provides a tax credit to the producers of biofuel constituents and a tax credit for consumer use of biofuels.²¹⁶ H.B. 2210 also allows for the creation of “renewable energy development zones” in rural areas in which exemptions from real property values can be claimed, thus reducing property tax assessments within a designated zone.²¹⁷

6. *Department of Environmental Quality Funding Act of 2007*
(H.B. 5023)

House Bill 5023 was passed by both houses and signed by the Governor in the 2007 legislative session.²¹⁸ The bill notes that a state of emergency exists from the lack of funding for the Department of Environmental Quality (DEQ).²¹⁹ H.B. 5023 allows the DEQ to raise existing permit fees and to enact new permits requiring fees.²²⁰ To the extent that the DEQ is urgently dedicated to combating global warming, any bill adding additional funds to the DEQ coffers would seem to be

²¹³ Press Release, Or. Env'tl. Council, Oregon Senate Passes HB 2210, Creating Renewable Fuel Standards, Promoting a Healthy Environment, Energy Independence and Rural Economic Development for Oregon (June 21, 2007), available at http://www.oeonline.org/press_releases/2007/HB2210passes.

²¹⁴ See, e.g., Editorial, *A Warming World: Drunk on Ethanol*, L.A. TIMES, Aug. 20, 2007, at A16 (arguing that the political “ethanol craze” merely serves small, powerful interest groups without adequate consideration of ethanol’s harmful economic and environmental effects).

²¹⁵ H.R. 2210, §§ 14–18, 74th Leg., Reg. Sess. (Or. 2007)

²¹⁶ *Id.* §§ 2, 26–32.

²¹⁷ *Id.* §§ 9–9a.

²¹⁸ H.R. 5023, 74th Leg., Reg. Sess. (Or. 2007).

²¹⁹ *Id.* § 2.

²²⁰ *Id.* § 1.

beneficial. That agency, however, has been roundly chastised for its enforcement and implementation failures.²²¹

7. *Vehicle Emissions Standards Act of 2007 (H.B. 2272)*

House Bill 2272 represents a landmark for Oregon's reduction of GHGs.²²² Specifically, H.B. 2272 requires that, beginning in 2009, new vehicles must comply with low emission standards set by the Environmental Quality Commission (EQC) pursuant to section 468A.360 of the Oregon Revised Statutes (ORS).²²³ The bill authorizes the Oregon Department of Transportation (ODOT) to deny registration to 2009 or later model year vehicles that fail to comply with the new standards.²²⁴ Additionally, H.B. 2272 provides additional enforcement powers for EQC tailpipe-emission standards that were promulgated by the EQC in June of 2006 and that require new vehicles meet California auto-emission standards.²²⁵

²²¹ See, e.g., BlueOregon, For Oregon's Polluters: Tough Rules, but Lax Enforcement, <http://www.blueoregon.com/2007/08/novick-takes-ai.html> (last visited Apr. 18, 2008).

²²² H.R. 2272, 74th Leg., Reg. Sess. (Or. 2007) (adopting the vehicle tailpipe emission standards in effect in California). H.R. 2272 had a long and bumpy ride to adoption:

[The Oregon House of Representatives] in 2005 passed a nonbinding resolution preventing state agencies from addressing global warming. Instead Gov[ernor] Kulongoski issued an executive order directing the Environmental Quality Commission ["EQC"] to adopt the standards through rulemaking. The EQC adopted temporary standards in Dec[ember] 2005 and made them permanent in June 2006. The legislation that was passed in the 2007 spring session [H.R. 2272 and H.R. 5023] implemented the standards by providing funding through [the Department of Environmental Quality] and providing [the Department of Motor Vehicles] the authority to deny registration to out-of[-]state vehicles that do not comply with the standards.

E-mail from Sallie Schullinger-Krause, Program Dir., Or. Env'tl. Council, to James L. Olmsted, Conservation & Preservation Counsel (July 9, 2007, 09:03 PST) (on file with author).

²²³ H.R. 2272, 74th Leg., Reg. Sess. (Or. 2007); see also OR. REV. STAT. § 803.350(8) (2007).

²²⁴ H.R. 2272, 74th Leg., Reg. Sess. (Or. 2007); see also OR. REV. STAT. § 803.350.

²²⁵ Arguably, matching Oregon's tailpipe-emissions standards to those of California may represent regionalism on a small scale because of the narrowness of the scope of the law. Nevertheless, when one considers the numbers of automobiles on the road in both states, H.R. 2272 takes on a new importance as a regulator of one of the largest categories of GHG contributors.

As discussed earlier in this Article, the Who, When, and How Test should be applied to all regional efforts to fight global warming. Using H.B. 2272 as an example, because it delegates the setting of standards to the EQC, pursuant to a hearing process set forth in ORS section 468A.360, it is possible that the Who part of the test will be failed if the EQC lacks the political and agency willpower to substantially lower emission standards. The How part of the tailpipe emissions law is partly outlined by delegating enforcement powers to ODOT. However, it is possible that ODOT may also lack the agency willpower to enforce tough emission standards. Thus, H.B. 2272 requires the will and the effort of two separate agencies to succeed in actually lowering GHGs from automobile tailpipe emissions.

C. Alphabet Soup: The Agencies and Implementing Entities

As discussed earlier, it is critical to measure any global warming legislation against the Who, When, and How Test. As noted earlier, no matter how good a piece of legislation may be, it can still be neutralized by the party ultimately charged with implementing it. That is to say, unless there is an agency, department, commission, or other body that has the wherewithal to implement the law to the best of its ability and is also allotted the funding and other resources necessary to get the job done, the legislation may be neutralized, undercut, or even implemented in a manner that is perverse to the original intent behind the law. The following tabulated information provides an overview of the agencies tasked with implementing the legislation discussed earlier. This information should allow the reader to quickly match the legislation with the responsible agency for purposes of monitoring agency performance in carrying out global warming legislation.

1. Energy Efficiency Act of 2006: Oregon Department of Energy

House Bill 3363, the Energy Efficiency Act of 2006, creates a laundry list of electricity-using products and sets standards for their efficiency. The Oregon Department of Energy (ODOE) is charged with implementing this Act, using test methods approved by the United States Department of Energy, or, in the

absence of federal guidelines, other appropriate and nationally recognized standards.²²⁶

2. *Renewable Energy Portfolio Standard: Community Services Department, People's Utility Districts, Public Utility Commission*

Senate Bill 838, the Renewable Energy Portfolio bill is lengthy, convoluted, and complex. Among the entities charged with implementing it are the Housing and Community Services Department (in consultation with the federal Advisory Committee on Energy), People's Utility Districts, and the PUC.²²⁷

3. *Western Climate Initiative: Governor's Advisory Group on Global Warming*

Implementing the Western Climate Initiative will require Oregon to supply representatives to various committees, commissions, working groups, and other collective bodies established by the WCI. Prior to the West Coast Governors' Global Warming Initiative morphing into the Western Climate Initiative, Oregon had convened a "Governor's Advisory Group on Global Warming." As noted in the WCI, "This stakeholder group will submit a comprehensive set of policy recommendations to Governor Kulongoski by the end of [2004]. A draft set of recommendations will be circulated for public comment from mid-October to mid-November. Oregon will hold three public meetings on the draft recommendations."²²⁸

The Advisory Group succeeded in its mission by producing one of the major documents—if not the major document—published to date by Oregon. The title of the Advisory Group's magnum opus is the "Oregon Strategy for Greenhouse Gas Reductions" which was authored by the Governor's Advisory Group on Global Warming and published on behalf of the

²²⁶ H.R. 3363, 73d Leg., Reg. Sess. § 8 (Or. 2006).

²²⁷ S. 838, 74th Leg., Reg. Sess. §§ 27, 30 (Or. 2007).

²²⁸ EXECUTIVE COMM. OF THE W. COAST GOVERNORS' GLOBAL WARMING INITIATIVE, WEST COAST GOVERNORS' GLOBAL WARMING INITIATIVE: STAFF RECOMMENDATIONS TO THE GOVERNORS 9 (2004), available at http://www.ef.org/westcoastclimate/WCGGWI_Nov_04%20Report.pdf.

Advisory Group by the ODOE.²²⁹ This 2004 date raises questions as to whether the Oregon Strategy was ever implemented, and if so, to what degree. It also raises questions as to whether the now three-year-old document is still sufficiently current as to be useful.

4. *The Climate Change Integration Act: Global Warming Advisory Commission, Climate Change Research Institute, Climate Change Integration Group*

As noted above, the West Coast Governors' Global Warming Initiative resulted in the formation of the Governors' Advisory Group on Global Warming, which drafted and published the 2004 compendium of global warming, the "Oregon Strategy for Greenhouse Gas Reductions." As of March of 2005, the Advisory Group had submitted its final report.

The Advisory Group's work lived on, however, in various subsequent actions which were based upon the Oregon Strategy for Greenhouse Gas Reductions. In the 2007 legislative session, H.B. 3543 was passed by both houses and signed into law by the Governor. This bill, known as the "Climate Change Integration Act" enacted into law greenhouse gas emission standards set forth in the Oregon Strategy for Greenhouse Gas Reductions. As noted in a previous section, the bill also created two new entities.

The first entity is the Global Warming Advisory Commission, which is charged with tracking and evaluating ongoing anti-global warming measures, making policy recommendations, and participating in public outreach. The second entity is the Climate Change Research Institute (Institute), which will be facilitated by the Oregon University System. The Institute is tasked with providing technical expertise to the Commission, to state agencies, and to local governments. The Institute will advance understanding of the impacts that global warming will have on Oregon's economy, natural resources, and social culture. In addition, the Institute will study mitigation measures and adaptive responses.²³⁰

²²⁹ OREGON STRATEGY, *supra* note 181.

²³⁰ See OR. REV. STAT. § 352.247(1)(d) (2007).

The Climate Change Integration Act also resulted in the creation of a third entity, namely, the Climate Change Integration Group (CCIG) which was created by Governor Kulongoski at the recommendation of the Advisory Group on Global Warming.²³¹ The CCIG was charged by the Governor with:

- (1) Develop[ing] a toolbox of options for curbing and coping with climate change. The tool box includes prioritizing and implementing policy recommendations in the *Oregon Strategy for Greenhouse Gas Reductions*; assisting state agencies and other groups to incorporate climate change into their policies and programs, and making additional policy and program recommendations to achieve the goals of the strategy;
- (2) Continually assess[ing] the “sensitivity, adaptive capacity, and vulnerability of natural as well as human economic and social systems to climate change in Oregon and prepare recommendations about how the state can become more resilient and prepare for unavoidable changes;
- (3) Initiat[ing] and support[ing] research aimed at identifying management opportunities and strategies for mitigation and adaptation, in collaboration with the Oregon University System;
- (4) Educat[ing] Oregonians by providing a clearinghouse for sharing information with citizens about climate change impacts and the opportunities in Oregon to address those impacts in an environmentally and economically sustainable manner.²³²

5. *Renewable Energy Act: Oregon Department of Energy, Oregon Department of Revenue*

The ODOE is charged with implementing House Bill 2210, also dubbed the “Renewable Energy Act.” As noted earlier, H.B. 2210 creates a comprehensive system of incentives for renewable energy use. As the implementing agency, ODOE is given rulemaking authority.²³³ Among the agencies the ODOE must consult with or whose rules and regulations ODOE’s rules and regulations must mesh with are the Oregon Department of

²³¹ Memorandum from Mark Abbott & Ned Dempsey, Co-Chairs, Climate Change Integration Group, to Governor Ted Kulongoski, State of Oregon (Jan. 8, 2007) (on file with author).

²³² *Id.* at 2.

²³³ H.R. 2210, 74th Leg., Reg. Sess. § 30 (Or. 2007).

Revenue, the California Air Resources Board, and the United States Environmental Protection Agency.²³⁴

6. *Department of Environmental Quality Funding Act: Department of Environmental Quality, Oregon Department of Administration*

House Bill 5023 enacts into law specified “new or increased [vehicle ownership] fees, adopted or modified” by the Department of Environmental Quality (DEQ) and approved by the Oregon Department of Administration.²³⁵

7. *Vehicle Emissions Standards Act: Oregon Department of Transportation*

In June of 2006, the Oregon Environmental Quality Commission (EQC) adopted rules requiring that new Oregon vehicles meet California automobile emission standards.²³⁶ By way of creating enforcement powers for the automobile emission standards, the legislature enacted House Bill 2272, the “Vehicle Emissions Standards Act” that authorizes the ODOT to deny registration to vehicles that fail to meet the new standards adopted by the EQC.²³⁷

When the Governor’s Advisory Group on Global Warming submitted its final report to Governor Kulongoski in March of 2005, the Advisory Group recommended that the Governor convene an interim workgroup on California’s emission standards, with the Pavley component.²³⁸ The Governor convened such a group and charged it with providing information on the costs, benefits, and impacts of following the California motor vehicle emission requirements. The workgroup was additionally charged with identifying the pros and cons of the implementation features associated with the California

²³⁴ *Id.* §§ 9, 27.

²³⁵ H.R. 5023, 74th Leg., Reg. Sess. (Or. 2007).

²³⁶ OR. ADMIN. R. 340-257-0010 to -0160 (2007).

²³⁷ OR. REV. STAT. § 803.350 (2007). This provision applies the California standards to motor vehicles beginning with the model year 2009 with an odometer reading of 7,500 miles or less at the time of registration in Oregon. *Id.* § 803.350(8).

²³⁸ OREGON STRATEGY, *supra* note 181, at v. The Pavley component refers to California’s auto tailpipe pollution standards, which “requires that new cars be able to meet the twin tests of low greenhouse gas emissions and cost-effectiveness to the purchaser.” *Id.*

motor vehicle emission requirements. The workgroup worked for four-and-a-half days in September and October. Upon conclusion of the workgroup's remarkably brief meeting, the workgroup, with the assistance of a facilitator and staffers from the DEQ, in November of 2005, produced a lengthy and technically detailed document entitled, "Governor's Vehicle Emissions Workgroup Report."²³⁹ As with the other documents mentioned in this Article, this Report is required reading for anyone attempting to assess what will actually be done, and by whom, in terms of real, tangible, on-the-ground actions.

VII CONCLUSION

This Article has outlined the imminence and seriousness of global warming. The Article has also set out an analytical framework that defines and provides examples of regionalism. Having developed an analytical framework for regionalism, the Article proffers a two-tier system for evaluating the efficacy of the various types of regionalism. The first tier of the system involves examination of three major factors: (1) prevention by reduction of greenhouse gases; (2) adaptation by protecting remaining environmental services; and (3) protecting the health, safety, and welfare of humanity. These factors were each discussed, though largely in the abstract, as it is beyond the scope of this Article to apply these analytical tools to a specific anti-global warming regime. Ideally, every complete anti-global warming system or regime would have all three factors; although, in practice, this is seldom the case. Typically, as in the Oregon case study, anti-global warming actions are assigned to a clique of agencies, without any single person, agency, or entity having true oversight responsibilities for making certain that all efforts dovetail with one another. In this sense, anti-global warming laws and the various anti-global warming regimes are the headless horsemen of legal, social, political, and technological change.

The second-tier factors are: (1) Who; (2) When; and (3) How. Despite the apparent simplicity of this two-tier system, it is typically very difficult to pry loose from the responsible

²³⁹ GOVERNOR'S VEHICLE EMISSIONS WORKGROUP REPORT (2005), available at <http://www.deq.state.or.us/air/orlev/docs/05Nov02WorkgroupRpt.pdf>.

governmental agency or other governmental entity the information needed for evaluating any particular factor. Thus, for any given new law or implementing entity, there is typically little institutional or procedural transparency through which to view the truly operative factors underlying decisions. One also encounters a fair amount of defensiveness from implementing agencies, likely because for any given aspect of global warming, we are collectively already far behind where we should be in terms of scientific understanding, public acceptance of scientific information and conclusions and, most of all, in terms of federal governmental action that is beyond mere greenwashing. Thus, while bureaucracies are almost always difficult to penetrate, this is especially true in the case of global warming and global climate change, which represent the greatest, most complex, and fastest moving challenges humanity has ever faced.

As with the first-tier analysis, it is beyond the scope of this Article to apply the second-tier analysis to a particular system. However, there are, nevertheless, certain predictable outcomes of such an analysis that must be watched for. To begin, the Who question is most likely to be an agency. The problem with agencies is that they tend to be highly bureaucratic, slow to act, subject to the political winds, and risk averse. Thus, no matter how visionary the legislation, its effects can be thwarted by an agency that is lazy, politically biased, or corrupt. As Professor Mary Christina Wood notes: "The current political paradigm in the United States gives little sense of government obligation."²⁴⁰ She advocates for the concept of a natural resources trust to steer government discretion in a manner that advances the public welfare.²⁴¹

²⁴⁰ Mary Christina Wood, NATURE'S TRUST: A PARADIGM FOR NATURAL RESOURCES STEWARDSHIP (2007), available at <http://www.law.uoregon.edu/faculty/mwood/docs/climateaction.pdf>.

²⁴¹ See *id.* As written by Professor Wood:

Our new leaders can and must reframe government's *discretion* to destroy Nature into an *obligation* to protect Nature and to ensure Natural Resource Stewardship. Drawing upon timeless, enduring legal principles and court decisions, leaders can characterize government as a trustee of the natural resources essential to human survival. A trust is a fundamental type of ownership whereby one manages property for the benefit of another. Viewed as a trust, the environment consists of a portfolio of quantified natural assets that government, in fact, manages. As beneficiaries, citizens hold a common property interest in defined, bounded assets that make up

Equally important is the When part of the test. Some of the most easily spotted defects in anti-global warming legislation and regulation are “soft” deadlines. These are deadlines that give the affected private sector entity or entities the maximum time in which to reap profits using the “old” methods before they have to invest money in the “new” climate smart methods. This Article was written in 2007 and published in 2008. Any legislation or regulation with a major deadline later than 2010 is going soft on the regulated entities. Carbon math tells us that we do not have the leisure time to do tomorrow what should have been done yesterday.

The How prong of the three-part test is the most technically difficult. One scenario which creates such difficulty occurs when a legislative body enacts a complex law and that law authorizes an agency to engage in rulemaking based on the law as well as granting the agency the powers to implement it. Thus by creating two or more levels of complexity, determining exactly how the law would work becomes onerous. Once the agency begins to implement the law, the water may be un-muddied somewhat, but there is no guarantee of that. A more ideal circumstance exists when public interest groups are operating in a full-time oversight mode and have penetrated the bureaucracy to determine precisely how the laws work (or should work).

In the final analysis, the ultimate standard against which any regional climate effort must be assessed involves carbon math. Citizens must assess the actual reductions in greenhouse gas emissions in order to evaluate progress at any jurisdictional level. Even for policy bodies that are fully attuned to climate crises, there is little time and much to do. Most elected officials seemingly have no idea of the challenges awaiting them, much less the consequences of their failure to meet such challenges. They hold public office during a historic, tumultuous time, but few even realize it.

Nature’s Trust . . . Trustees have a clear fiduciary obligation to protect trust assets . . . [G]overnment’s failure to mount a national climate defense is akin to sitting idle during an attack on American soil.

Id.

