

Journal of Civil Rights and Economic Development

Volume 23
Issue 3 *Volume 23, Fall 2008, Issue 3*

Article 4

October 2008

Climate Surfing: A Conceptual Guide to Drafting Conservation Easements in the Age of Global Warming

James L. Olmsted Esq.

Follow this and additional works at: <https://scholarship.law.stjohns.edu/jcred>

Recommended Citation

Olmsted, James L. Esq. (2008) "Climate Surfing: A Conceptual Guide to Drafting Conservation Easements in the Age of Global Warming," *Journal of Civil Rights and Economic Development*. Vol. 23 : Iss. 3 , Article 4.

Available at: <https://scholarship.law.stjohns.edu/jcred/vol23/iss3/4>

This Article is brought to you for free and open access by the Journals at St. John's Law Scholarship Repository. It has been accepted for inclusion in Journal of Civil Rights and Economic Development by an authorized editor of St. John's Law Scholarship Repository. For more information, please contact selbyc@stjohns.edu.

CLIMATE SURFING: A CONCEPTUAL GUIDE TO DRAFTING CONSERVATION EASEMENTS IN THE AGE OF GLOBAL WARMING

JAMES L. OLMSTED, ESQ.*

INTRODUCTION

A. As the Ice Caps Melt

This article is directed to the land trust community and to other individuals and organizations that seek to preserve and protect land through conservation easements. “It begins with the assumption, based upon overwhelming scientific data and analysis, that global warming is here and is having disastrous effects. To support this assumption, this article provides the reader with citations to a mountain of research and scholarship that has been published on the subject of climate change in the past three years. Given the reality of global warming, this article examines how conservation easements should be drafted to help deal with the sweeping and devastating changes global warming will bring.

This article is a sequel to a previous law review article addressing many of the same core issues.¹ Thus, this article covers some previously trodden ground, but in new ways. Like its predecessor, this article argues that upon any easement termina-

* Jim Olmsted is a graduate of the University of California at Davis, School of Law. He is licensed to practice law in California, Nevada, Oregon and Washington. He is the founder and owner of Conservation and Preservation Counsel, L.L.C., a Eugene, Oregon, based law firm that specializes in representing land trusts and landowners in land conservation acquisitions.

¹ See James L. Olmsted, *Capturing the Value of Appreciated Development Rights on Conservation Easement Termination*, 30 ENVIRONS ENVTL. L. & POL’Y J. 39 (Fall 2006).

tion, it is the holder of a conservation easement, and not the underlying landowner, that is entitled to the appreciated value of the development rights held in abeyance by a conservation easement. In addition, both articles also address conservation easement provisions that would calculate and direct such appreciated value to the easement holder and that would also prevent the landowner from receiving an unwarranted windfall. Finally, both articles discuss a new type of conservation easement, namely an "ark" easement, which is intended to assist species and ecosystems in global warming caused migrations by being terminable at the easement holder's option.

However, unlike the previous article, this article devotes additional attention to what will be one of the most prominent effects of climate change, namely the mass migrations of plant and animal species as they "climate surf" to keep pace with the underlying pole-ward shifts in the climates in which they evolved. As well as raising awareness of the general need to address these climate change issues in future conservation easements, this article proposes certain specific changes in drafting conservation easements which should be incorporated in all new conservation easements even now, as the ice caps melt.² While reviewing both

² See WILLIAM SWEET, *KICKING THE CARBON HABIT: GLOBAL WARMING AND THE CASE FOR RENEWABLE AND NUCLEAR ENERGY* 1, 136-37 (Columbia University Press 2006) (noting that "Arctic ice has thinned by as much as 40 percent in the last three decades," and also recording the chronology of loss of Antarctic ice: in 1995, Larsen A ice shelf disintegrated; in 1998, the Wilkins ice shelf collapsed; in 2002, the Larsen B ice shelf shattered); see also MARLA CONE, *SILENT SNOW: THE SLOW POISONING OF THE ARCTIC* 169 (Grove Press 2005) ("As global temperatures rise, the higher latitudes are particularly vulnerable to pronounced effects, and substantial changes in the ice have already been documented."); DAVID HELVARG, *BLUE FRONTIER: DISPATCHES FROM AMERICA'S OCEAN WILDERNESS* 118 (Sierra Club Books 2006) (on file with author) ("Since 1970 climatologists have predicted that global warming, as it kicks in, would occur most rapidly at the poles, a fact now confirmed by scientists in Alaska, Canada, and Greenland, at the North Pole, and here on the Antarctic Peninsula."); GEORGE OCHOA, JENNIFER HOFFMAN & TINA TIN, *CLIMATE: THE FORCE THAT SHAPES OUR WORLD AND THE FUTURE OF LIFE ON EARTH* (Rodale 2005) (revealing in a summary of Chapter 6, "Melting Snow and Ice," that, "[d]ramatic evidence shows that climate in the polar and alpine regions is changing at alarming speeds, melting glaciers and reducing ice coverage in crucial places, and exerting a profound effect on global climate."); Andrew C. Revkin, *Arctic Ice Melting Faster Than Expected*, N.Y. TIMES, Dec. 12, 2006 at F3 (describing emerging scientific predictions regarding increased rates at which Arctic ice is melting); DOUG MACDOUGALL, *FROZEN EARTH: THE ONCE AND FUTURE STORY OF ICE AGES* 233 (University of California Press 2004) ("Recent concern about global warming, and especially the impact of mankind's addition of greenhouse gases to the natural atmospheric inventory, has led to increased awareness of the role these gases may play in starting or ending ice ages."); Paul Nicklen, *Life at the Edge*, NAT'L GEOGRAPHIC, June 2007, available at <http://ngm.nationalgeographic.com/ngm/>

articles would allow the reader to see how the ideas in the present article have evolved and changed, this article is sufficiently self-contained that it is not necessary to read the prior article by way of an introduction.

B. *A Scientific Certainty*

Neither the existence nor the imminence of global warming is any longer subject to scientific doubt. The world's scientific community stands in complete consensus on the issue of global warming. Not only will human-caused global warming occur, it is already occurring. Likewise, not only will such human-caused global warming open a Pandora's Box of disastrous human and environmental consequences, many such consequences are already here. Indeed, climate scientists have already moved beyond describing the nature and effects of global warming to the "autobiographical" phase of writing their own histories of the discovery of global warming and climate change.³ To repeat, no rational and informed mind could doubt the existence and imminence of global warming and its dire consequences.⁴ Accordingly,

0706/feature1/ (documenting our planet's dwindling supply of polar ice); Tim Appenzeller, *The Big Thaw*, NAT'L GEOGRAPHIC, June 2007, available at <http://ngm.nationalgeographic.com/ngm/0706/feature2/> (warning, surprisingly, for this periodical, that "[i]t's no surprise that a warming climate is melting the world's glaciers and polar ice. But no one expected it to happen this fast.").

³ See SPENCER R. WEART, *THE DISCOVERY OF GLOBAL WARMING*, ix-x (Harvard University Press 2003) (describing a website, found at <http://www.aip.org/history/climate/>, which contains over two dozen essays running in parallel, interconnected by over 700 hyperlinks, and with references to over 1,000 scientific and historical publications); see generally GALE E. CHRISTIANSON, *GREENHOUSE: THE 200-YEAR STORY OF GLOBAL WARMING* (Walker & Co. 1999) (providing a study of the greenhouse effect and its impact on human history); MATTHEW J. HOFFMANN, *OZONE DEPLETION AND CLIMATE CHANGE: CONSTRUCTING A GLOBAL RESPONSE* (SUNY Press 2005) (highlighting emerging global responses to climate change and ozone depletion since the 1980's).

⁴ Because of the overwhelming consensus among the global scientific community regarding the imminence and likely disastrous consequences of global warming and global climate change, it is difficult to find any credible evidence or analysis to the contrary. Nevertheless, a number of so-called "disinformation specialists" have managed to publish challenges to the global consensus. Notable among such authors for his overly confident and under-researched writing style is Robert G. Williscroft, author of *THE CHICKEN LITTLE AGENDA: DEBUNKING "EXPERTS" LIES*. ROBERT G. WILLISCROFT, *THE CHICKEN LITTLE AGENDA: DEBUNKING "EXPERTS" LIES*, (Pelican Publishing Company 2006). As it is beyond the scope of this article to rebut a work such as *THE CHICKEN LITTLE AGENDA: DEBUNKING "EXPERTS" LIES*, suffice it to say that anyone not already pre-disposed to disbelieve the vast majority of the world's scientists will find Williscroft's prose self-rebutting. A further reason for dismissing this book is its remarkable lack of citation to a single scientific study and the book's reliance on a mere thirty or so secondary sources,

this article will not spend much time arguing the existence of human-caused global warming and climate change. It is already here, and there is an immense and ever-growing body of evidence to prove it.⁵

most of them too dated to have even considered the current overwhelming body of scientific evidence supporting the existence of global warming.

In a category related to those ideologues that dismiss the painstakingly formulated consensus of the world's premier scientists on the subject of global warming are those who admit to the problem but believe descriptions of its intractability to be exaggerated. Prominent in this group are those who believe that all that is needed is a creative technological fix, thereby avoiding the need to undertake such onerous and expensive measures as cutting back greenhouse gas emissions. A number of these climate quacks and their ideas ranging from the frivolous to the frightening are chronicled in the lead story of the Spring 2007 issue of THE WILSON QUARTERLY. James R. Fleming, *The Climate Engineers: Playing God to Save the Planet*, THE WILSON QUARTERLY, Spring 2007, at 46. Among the "solutions" advanced by these would be masters of the Earth's climate is bouncing sunlight back into space by using heavy artillery to shoot tons of highly reflective sulfate aerosols or specially engineered reflective nanoparticles into the atmosphere. *Id.* In the event that the constant bombardment of the atmosphere by climate altering artillery failed to work, fleets of B-747's circling continuously around the arctic could act as global "crop dusters," seeding the atmosphere with millions of tons of reflective material. *Id.* Should these measures not work, a 25-kilometer-long "sky hose" tethered to a military super-blimp might solve the problem. *Id.* Other ideas sharing a similar Jules Verne-like quality include launching mirrors into orbit and spreading floating reflective particles over extensive areas of the tropical sea. *Id.* As noted by the article's author, "[t]here are signs among the geoengineers of an overconfidence in technology as a solution of first resort. Many appear to possess a too-literal belief in progress that produces an anything-is-possible mentality, abetted by a basic misunderstanding of the nature of today's climate models." *Id.* at 60. Also of significance in this issue of the magazine is the cover format, which depicts a scientist aiming a high-tech gun-like device at an image of an angry and powerful sun. *Id.* By framing the global crisis as a battle between science and an angry, god-like sun, the publishers of the magazine subtly attempt to draw negative attention from the true sources of global warming, i.e., the injection into the atmosphere of vast amounts of greenhouse gases by humanity.

As just discussed, head-in-the-sand interests attempt to subvert any potentially costly efforts to fight global warming by such tactics as stating that the science proving global warming is actually uncertain, by proposing science fiction type technological fixes and by reframing the problem as a battle between human kind, which is good, and nature, which is bad or, at least, indifferent in a dangerous fashion. Still another tactic is in one way or another burying accurate information about the nature of the problem and its consequences. Sometimes this tactic is subtle, sometimes not. In the not so subtle category, it was recently reported that the Smithsonian Institution toned down its global warming exhibit for fear of drawing the wrath of the George W. Bush administration. Brett Zonger, *Smithsonian Tones Down Climate Exhibit*, THE REGISTER-GUARD, May 22, 2007, at A11. In this article from the Associated Press, the lead paragraph states: "[t]he Smithsonian Institution toned down an exhibit on climate change for fear of angering Congress and the Bush administration, a former administrator at the museum says." *Id.*

⁵ For those readers who may harbor some small, lingering doubts as to the reality and imminence of global warming and climate change, the following list of recent and collectively unimpeachable books and articles on the subject should be sufficient to dispel all remaining doubt. For those readers who have seen the writing on the wall, the following list is offered as a convenient compendium of useful authority on the subject to be used at

the reader's discretion. Any such list must begin with Al Gore's book, *AN INCONVENIENT TRUTH*. AL GORE, *AN INCONVENIENT TRUTH: THE PLANETARY EMERGENCY OF GLOBAL WARMING AND WHAT WE CAN DO ABOUT IT* (Rodale 2006). The reader should note that there is a slide show version of Al Gore's book, which Mr. Gore has shown and narrated literally all around the globe. More importantly, a documentary film titled "AN INCONVENIENT TRUTH" recently won an Oscar. See 79th Academy Award Winners, http://www.oscars.org/79academyawards/winners/10_doc_feature.html (last visited Sept. 2, 2008). The film was in many ways a sincere filmic diary of Al Gore the man, but the heart of the film and most of the footage was devoted to turning Mr. Gore's slide show into a documentary with very high production values. That *AN INCONVENIENT TRUTH*, a pull-no-punches testimonial about the causes and consequences of global warming should win an Oscar is perhaps some of the best news to come from a nation which is so committed to maintaining the status quo that brought our planet to this crisis. That Mr. Gore, along with the IPCC, was recently awarded the Nobel Peace Prize for his crusade against global warming has likewise greatly expanded recognition of the crisis of global warming. See *Al Gore Wins Nobel Peace Prize*, MSNBC, Oct. 12, 2007, <http://www.msnbc.msn.com/id/21262661> (last visited Nov. 2, 2007).

The scientific community has resoundingly come to the conclusion that global warming exists. As Frederick Buell explains, "[t]hrough meaningful awareness of the dangers of global warming has been successfully postponed by disinformation campaigns in the United States and meaningful international action is not now very likely, the scientific consensus is now firm that global warming is indeed happening and involves enormous risks for the earth's ecosystems and human society." FREDERICK BUELL, *FROM APOCALYPSE TO WAY OF LIFE: ENVIRONMENTAL CRISIS IN THE AMERICAN CENTURY* 101-02 (Routledge 2003). Robert F. Kennedy, Jr. comments "[s]cientists agree that we are now pumping out vastly more [carbon dioxide] than the Earth's system can safely assimilate." ROBERT F. KENNEDY, JR., *CRIMES AGAINST NATURE* 46 (HarperCollins 2004). In light of the all-but-unanimous message from the scientific community, "[n]o one can doubt any longer that more carbon dioxide tends to warm the atmosphere." CHARLES WOHLFORTH, *THE WHALE AND THE SUPERCOMPUTER: ON THE NORTHERN FRONT OF CLIMATE CHANGE* 151 (North Point Press 2004). Truly, "[w]hen not even Fox News wants to pick a fight with Al Gore over global warming, you know the debate is over." Benjamin Svetkey, *How Al Gore Tamed Hollywood*, ENTERTAINMENT WEEKLY, July 21, 2006, at 32.

If the refrain of a chorus of scientists is not convincing, the reader is encouraged to review works describing the physical effects of climate change. "While mountain glaciers had been discounted as insignificant, it has now been shown that the pervasive retreat of the glaciers in Alaska and Patagonia alone is probably the greatest single contributor to rising sea levels today." MARK BOWEN, *THIN ICE: UNLOCKING THE SECRETS OF CLIMATE IN THE WORLD'S HIGHEST MOUNTAINS* 393 (Henry Holt and Co. 2005). Indeed, "[w]orldwide, 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." GRETEL EHRlich, *THE FUTURE OF ICE* 46-47 (Vintage Books 2004). Diminishing ice cover is a recurring theme: "[r]esearchers warn that Arctic ice melting is accelerating, with an 8-percent loss in sea ice area over the past 30 years and the possibility of ice-free summers before 2100." STATE OF THE WORLD 2006: A WORLDWATCH INSTITUTE REPORT ON PROGRESS TOWARD A SUSTAINABLE SOCIETY xxvii (W.W. Norton & Co. 2006). So too is the effect of climate change on weather patterns. "There's no doubt about it: Global warming – which is already happening – *will* change hurricanes. . . . Human beings are already changing the environments in which hurricanes form and attain their terrifying strength, which means hurricanes will inevitably change, too[.]" although we do not know precisely how hurricanes will change. CHRIS MOONEY, *STORM WORLD: HURRICANES, POLITICS, AND THE BATTLE OVER GLOBAL WARMING* 260 (Harcourt 2007). Looking at the effect of global warming on the atmosphere, Gary Stix concludes,

"[t]he debate on global warming is over. Present levels of carbon dioxide -- nearing 400 parts per million (ppm) in the earth's atmosphere -- are higher than they have been at any time in the past 650,000 years and could easily surpass 500 ppm by the year 2050 without radical intervention." Gary Stix, *A Climate Repair Manual*, SCI. AM., Sept. 2006, at 46.

In the end, one conclusion seems inevitable: "[w]arming as large and rapid as that projected for the twenty-first century might be expected to create severe problems for natural ecosystems and human societies." A. BARRIE PITTOCK, *CLIMATE CHANGE: TURNING UP THE HEAT* 21 (Csiro Publishing 2d prtg. 2007). As one author has noted, while "[w]e didn't create this world, but we are busy decreasing it." BILL MCKIBBEN, *THE END OF NATURE* xxv (Anchor Books 2d ed. 1999). Another worry of the consequences of apathy is noted by Joseph Romm: "I do believe that if we fail to act in time, it will be the single biggest regret any of us has at the end of our lives." JOSEPH ROMM, *HELL AND HIGH WATER: GLOBAL WARMING -- THE SOLUTION AND THE POLITICS -- AND WHAT WE SHOULD DO* 237 (William Morrow 2007). Wryly quoting William Shakespeare's, *The Tempest*, Gale E. Christianson wonders "[h]ow cam'st thou in this pickle?" GALE E. CHRISTIANSON, *GREENHOUSE: THE 200-YEAR HISTORY OF GLOBAL WARMING* [unnumbered page] (Walker and Co. 1999). "[W]e can conclude (with the IPCC) that it is *very likely* that significant global warming is coming in our lifetimes. This surely brings a likelihood of harm, widespread and grave." *DISCOVERY OF GLOBAL WARMING*, *supra* note 3, at 199.

Even beyond these observations, there remains a veritable glut of other sources explaining the global warming crisis. See ART BELL & WHITLEY STRIEBER, *THE COMING GLOBAL SUPERSTORM* (G.K. Hall & Co. 2000); JOHN D. COX, *CLIMATE CRASH: ABRUPT CLIMATE CHANGE AND WHAT IT MEANS FOR OUR FUTURE* (Joseph Henry Press 2005); TIM FLANNERY, *THE WEATHER MAKERS: HOW MAN IS CHANGING THE CLIMATE AND WHAT IT MEANS FOR LIFE ON EARTH* (Atlantic Monthly Press 2005); 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* (Basic Books 2004); DINYAR GODREJ, *THE NO-ONSENSE GUIDE TO CLIMATE CHANGE* (New Internationalist 2001); JOHN GRIBBIN, *HOTHOUSE EARTH: THE GREENHOUSE EFFECT AND GAIA* (Grove Weidenfeld 1990); SUSAN JOY HASSOL, *IMPACTS OF A WARMING ARCTIC -- ARCTIC CLIMATE IMPACT ASSESSMENT* (Cambridge University Press 2004); ROBERT HENSON, *THE ROUGH GUIDE TO CLIMATE CHANGE: THE SYMPTOMS, THE SCIENCE, THE SOLUTIONS* (DK Publishing 2006); JOHN HOUGHTON, *GLOBAL WARMING: THE COMPLETE BRIEFING* (Cambridge University Press 2d ed. 1997); BRUCE E. JOHANSEN, *GLOBAL WARMING IN THE TWENTY-FIRST CENTURY: VOLUME 1: OUR EVOLVING CLIMATE CRISIS* (Praeger Perspectives 2006); CHAD KISTER, *ARCTIC MELTING: HOW CLIMATE CHANGE IS DESTROYING ONE OF THE WORLD'S LARGEST WILDERNESS AREAS* (Common Courage Press 2005); ELIZABETH KOLBERT, *FIELD NOTES FROM A CATASTROPHE: MAN, NATURE, AND CLIMATE CHANGE* (Bloomsbury Publishing 2006); JAMES HOWARD KUNTLER, *THE LONG EMERGENCY: SURVIVING THE END OF OIL, CLIMATE CHANGE AND OTHER CONVERGING CATASTROPHES OF THE TWENTY-FIRST CENTURY* (Grove Press 2006); EUGENE LINDEN, *THE WINDS OF CHANGE: CLIMATE, WEATHER, AND THE DESTRUCTION OF CIVILIZATION* (Simon & Schuster 2007); JAMES LOVELOCK, *THE REVENGE OF GAIA: EARTH'S CLIMATE CRISIS & THE FATE OF HUMANITY* (Perseus Books Group 2007); MARK LYNAS, *HIGH TIDE: THE TRUTH ABOUT OUR CLIMATE CRISIS* (Picador 2004); MARK MASLIN, *GLOBAL WARMING: A VERY SHORT INTRODUCTION* (Oxford University Press 2004); PAUL ANDREW MAYEWSKI & FRANK WHITE, *THE ICE CHRONICLES: THE QUEST TO UNDERSTAND GLOBAL CLIMATE CHANGE* (University Press of New England 2002); JIM MOTAVALLI, *FEELING THE HEAT: DISPATCHES FROM THE FRONTLINES OF CLIMATE CHANGE* (Taylor & Francis 2007); *NATURE'S EXTREMES: INSIDE THE GREAT NATURAL DISASTERS THAT SHAPE LIFE ON EARTH*, (Time Home Entertainment 2006); GEORGE OCHOA, JENNIFER HOFFMAN & TINA TIN, *CLIMATE: THE FORCE THAT SHAPES OUR WORLD AND THE FUTURE OF LIFE ON EARTH* (Ro-

dale Books 2005); MICHAEL OPPENHEIMER & ROBERT H. BOYLE, *DEAD HEAT: THE RACE AGAINST THE GREENHOUSE EFFECT* (New Republic Books 1990); FRED PEARCE, *GLOBAL WARMING: A BEGINNER'S GUIDE TO OUR CHANGING CLIMATE* (DK Publishing Inc. 2002); STUART L. PIMM, *A SCIENTIST AUDITS THE EARTH* (Rutgers University Press 2004) (2001); BOB REISS, *THE COMING STORM: EXTREME WEATHER AND OUR TERRIFYING FUTURE* (Hyperion 2001); WILLIAM F. RUDDIMAN, *PLOWS, PLAGUES & PETROLEUM: HOW HUMANS TOOK CONTROL OF CLIMATE* (Princeton University Press 2005); JAMES GUSTAVE SPETH, *RED SKY AT MORNING: AMERICA AND THE CRISIS OF THE GLOBAL ENVIRONMENT* (Yale University Press 2004); WILLIAM K. STEVENS, *CHANGE IN THE WEATHER: PEOPLE, WEATHER, AND THE SCIENCE OF CLIMATE* (Dell Publishing 2001); SWEET, *supra* note 2; MIKE TIDWELL, *THE RAVAGING TIDE: STRANGE WEATHER, FUTURE KATRINAS, AND THE COMING DEATH OF AMERICA'S COASTAL CITIES* (Free Press 2006); DAVID G. VICTOR, *THE COLLAPSE OF THE KYOTO PROTOCOL: AND THE STRUGGLE TO SLOW GLOBAL WARMING* (Princeton University Press 2004); Maria Gilardin, *Apocalypse Now: How Mankind is Sleepwalking to the End of the Earth*, LEFT CURVE No. 30 (Kelly Knauer, ed., 2006), available at <http://www.leftcurve.org/LC30WebPages/ApocalypseNow.html>; Beth Daley, *National Panel Supports '98 Global Warming Evidence*, BOSTON GLOBE, June 23, 2006, at A1; Ross Gelbspan, *Reality Check: The Global Warming Debate is Over. It's Real, Inexorable, and Headed Our Way*, E MAGAZINE, Sept./Oct. 2000, <http://www.emagazine.com/view/?1049> (last visited Sept. 7, 2008); Julia Whitty, *The Thirteenth Tipping Point: 12 Global Disasters and 1 Powerful Antidote*, MOTHER JONES, Nov./Dec. 2006, at 45; *From Seattle to Stockholm, Ambitious Programs Seek to Reduce Carbon Emissions to Fight Climate Change*, E: THE ENVIRONMENTAL MAGAZINE, <http://americajr.com/news/carbonemissions.html> (last visited Sept. 7, 2008).

As this article goes to press, the number of publications expressing agreement with the conclusion that human caused global warming exists and will result in disastrous consequences for humankind and nature continues to grow. Continuing her journalistic responses to global warming, Julia Whitty provides her most dire and eloquent warning to date in this article: Julia Whitty, *By the end of the Century Half of all Species Will be Gone. Who Will Survive?*, MOTHER JONES, May/June 2007, at 36. Interestingly the article, while not a bit optimistic, provides the most potentially workable on-the-ground response to global warming thus seen by this author, namely "rewilding" North America through four continent-wide corridors. *Id.* For an article dispelling myths about global warming and providing compelling graphs of climate change variables, see Catherine Brahic, *Climate Myths*, NEW SCIENTIST, May 19, 2007, at 34. For a comprehensive and detailed explanation of climate science and global warming, helpfully illustrated with multiple graphs, see William Collins et al., *The Physical Science Behind Climate Change*, SCI. AM., Aug. 2007, at 64. For an outstanding synthesis of *THE WEATHER MAKERS: HOW MAN IS CHANGING THE CLIMATE AND WHAT IT MEANS FOR LIFE ON EARTH*, FIELD NOTES FROM A CATASTROPHE: MAN, NATURE AND CLIMATE CHANGE and the book and film versions of *AN INCONVENIENT TRUTH* by the Director of the NASA Goddard Institute for Space Studies and an Adjunct Professor of Earth and Environmental Sciences at Columbia University's Earth Institute, see Jim Hansen, *The Threat to the Planet*, 53 N.Y. REVIEW OF BOOKS 12 (July 13, 2006) (book review). For an interesting, if brief, description of Jim Hansen's background and his struggles with the George W. Bush administration, see Bruce E. Johansen, *The Paul Revere of Global Warming*, THE PROGRESSIVE, Aug. 2006, at 26. For devotees of THE NATION'S unique journalistic style, its special issue on global warming is well worth tracking down. Including articles by global warming front-liners Jim Hansen and Mark Hertsgaard, the special issue also carries serious articles on subjects such as how the pollution by the wealthy wreaks havoc on the lives of the poor, technological mitigation measures for coal burning plants and artistic responses to global warming. THE NATION: SPECIAL ISSUE, May 7, 2007 (bearing the cover: "Surviving the Climate Crisis: What Must be Done").

C. *A Collective Wake-Up Call*

Unfortunately, though the scientific community is well aware of the looming specter of global warming, this does not mean that that this level of awareness is reflected in either the American press or American political leadership. The majority of Americans seem more concerned with “news” of sensational crimes and celebrity gossip than with anything as serious, or as real, as global warming.⁶ It is an unfortunate state of affairs when the general populace of the largest producer of greenhouse gases, and thus the country most responsible for global warming,⁷ is generally ignorant of these facts.⁸ Equally disturbing is the fact that even among those who understand the nature and consequences of global warming, few are willing to take any meaningful action to slow or reverse the process.⁹ Unfortunately, this head-in-the-sand response to global warming is descriptive of the populations of most industrial countries with the differences in collective ignorance and inaction merely a matter of degree.

Ironically, it is the poor and indigenous peoples of the world that are among those most knowledgeable about the disastrous effects of global warming because they are already experiencing them first hand. Ask an Andean peasant why the glaciers that provide his community with fresh water are melting, and he will

⁶ See GORE, *supra* note 5, at 262-64 (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); see also LINDEN, *supra* note 5, at 219 (providing graph and supporting narrative demonstrating the increasing and remarkable degree of scientific consensus regarding nature, magnitude, timing and consequences of climate change as compared to 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. 2000, at 24-25, http://findarticles.com/p/articles/mi_m1594/is_5_11/ai_65913629/print (last visited Sept. 7, 2008) (discussing how oil and coal industries exercise control over mainstream media amounting to full-blown corporate censorship).

⁷ See GORE, *supra* note 5, at 250-51 (demonstrating in the amount of greenhouse gas produced by the United States).

⁸ See *id.* at 262-64 (highlighting the misconception held by the general public with respect to scientific consensus surrounding global warming).

⁹ See *Points of Light: The World Wakes Up to Climate Change*, E: THE ENVIRONMENTAL MAGAZINE, July 2006, at 1, <http://www.emagazine.com/view/?3257&printview&imagesoff> (last visited Sept. 7, 2008). “The public is only beginning to wake up to the reality of climate change. A record 57 percent of Americans, according to the most recent Gallup Poll, now believe that climate change is underway, but only 36 percent say they worry about it ‘a great deal.’” *Id.*

respond that it is due to global warming. The same goes for the indigenous inhabitants of the earth's arctic regions. The Inuit are well aware that it is primarily the greenhouse gases of the industrial nations that have caused the permafrost to melt and Inuit homes to sink in the resulting muck. They are equally aware that it is those same greenhouse gases that have changed the weather and ice conditions so greatly that it is increasingly difficult for them to continue the subsistence life styles they have maintained for untold thousands of years.¹⁰

Fortunately, the floodgates of the popular press appear to be opening for increasingly candid appraisals of the global warming threat. Interestingly, some of the first acknowledgments of the problem appeared in cartoon and disaster movie format.¹¹ In a major journalistic step forward, *Vanity Fair* published its "Special Green Issue," in the last week of April, 2006, featuring a cover photograph that included Al Gore, Robert F. Kennedy, Jr., George Clooney and Julia Roberts.¹² Within a month, Al Gore's visage dominated the cover of *Wired* magazine, which contained more coverage of the global warming crisis.¹³ Within a year, *Vanity Fair* would publish its second "Green Issue," once again devoting cover-space and article coverage of the global warming cri-

¹⁰See generally KISTER, *supra* note 5 (describing global warming's alarming impact on glaciers that are receding one half mile per year); see also WOHLFORTH, *supra* note 5 (reporting global warming's impact on Arctic weather patterns); Ben Orlove & Ellen Wiegant, *Human Dimensions of Glacial Retreat: Mountain Communities in the Context of Climate Change*, <http://www.x-cd.com/mcss04/papers/P51.pdf> (last visited Sept. 7, 2008) (presenting findings from anthropological studies of communities located near glaciers that have experienced significant retreat in the twentieth century).

¹¹ See FUTURAMA: CRIMES OF THE HOT (Fox television broadcast Sunday Nov. 10, 2002) (featuring a cameo appearance by Al Gore in this episode which finds Professor Farnsworth claiming responsibility for a global warming crisis); see also THE DAY AFTER TOMORROW (Twentieth Century Fox Film Corporation 2004) (chronicling devastating effects of abrupt global climate change, including multiple hurricanes, tornadoes, tidal waves, floods and the beginning of the next Ice Age); SOYLENT GREEN (Warner Brothers 1973) (portraying, in one of the earliest films in which global warming plays a major role, the "greenhouse effect," which, in this cult sci-fi classic, affects the population, disease and greed on earth so severely that it results in mass human cannibalism promoted by the multi-national corporation "Soylent").

¹² VANITY FAIR "SPECIAL GREEN ISSUE," May 2006 (bearing cover title: "A Threat Graver than Terrorism: Global Warming, How much of New York, Washington, and other American cities will be underwater?").

¹³ WIRED, May 2006 (bearing cover title: "Climate Crisis! The Pro-Growth, Pro-Tech Fight to Stop Global Warming").

sis.¹⁴ Fortunately, the popular press has shown a trend towards

¹⁴ See, VANITY FAIR "OUR 2ND ANNUAL GREEN ISSUE", May 2007. Continuing its new found tradition of high profile environmental coverage, Vanity Fair recently issued its third annual "Green Issue" in May of 2008. VANITY FAIR "SPECIAL GREEN ISSUE," May 2008. The third "Green Issue" contains, among other articles, coverage of chemical giant Monsanto's "Assault on Farmers," "A Letter to the Next President" by Robert F. Kennedy, Jr. and "Selling Out Polar Bears" by Michael Shnayerson. *Id.* Other indications of an increasing awareness of the imminent peril of global warming and global climate change are also beginning to appear. For example, even the conservative periodical, THE ECONOMIST, recently saw fit to devote an entire issue to climate change. See *The Heat is On; Climate Change*, THE ECONOMIST, Sept. 9, 2006, at 51. A similarly thorough, if ambivalent, treatment of global climate change had occurred in the equally conservative periodical, NATIONAL GEOGRAPHIC, as early as 1998. See Curt Suplee, *Unlocking the Climate Puzzle*, NAT'L GEOGRAPHIC, May 1998 at 38. Tellingly, the editors made global climate change the lead story, including devoting the entire cover to the subject, in that magazine's special series heralding in the new millennium. For example, this particular issue was identified as the "Millennium Supplement: Physical World." *Id.* Yet another, and rather remarkable, instance of a normally conservative publication jumping on the climate change bandwagon appears in the January 2007 edition of the California Bar Journal. See Diane Curtis, *Environmental Law Enters the Age of Global Warming*, CAL. ST. B.J., Jan., 2007. Not only is global warming mentioned, it is given top billing as the lead story. *Id.* Despite the opportunistic stance taken by this article, i.e., that global warming will make more work for attorneys, the appearance of the article in this publication is a positive event in terms of facing up to the greatest environmental threat in human history. *Id.* "Most policymakers and scientists believe if we don't do anything about climate change, it's going to have a significant impact," says [Sean Hecht, Executive Director of UCLA's Environmental Law Center and chair of California's State Bar's Environmental Law Section], adding that attorneys are needed in every phase of the action." *Id.* at 1. ROLLING STONE magazine has likewise seen fit to spread the word by publishing a "Special Report" on global warming in its June 28, 2007 issue. *The Climate Crisis: A Rolling Stone Special Report*, ROLLING STONE, June 28, 2007. This issue contained powerful articles referencing the anti-global warming work of Al Gore and Robert F. Kennedy, Jr., as well as an article examining "the Bush administration's secret campaign to deny global warming and let polluters shape America's climate policy." See Eric Bates, Jeff Goodell, Tim Dickinson & Robert F. Kennedy, Jr., *The Climate Crisis: A Rolling Stone Special Report*, ROLLING STONE, June 28, 2007 at 49-57. With mainstream periodicals of the likes of ROLLING STONE, NATIONAL GEOGRAPHIC, TIME, NEWSWEEK and THE ECONOMIST, jumping on the global warming bandwagon, it was only mildly surprising to find both COSMOPOLITAN and MS. MAGAZINE have joined the club of concerned publications willing to devote ink to such a disturbing topic. See Cara Litke, *How to Help Save the Planet*, COSMOPOLITAN, May 2007, at 232; Laura Orlando, *The Melting Point*, MS. MAGAZINE, Spring 2007, at 34. The MS. MAGAZINE issue bears the cover title: "Rising Up to Stop Global Warming" and notes that "As the Earth heads toward catastrophe, women leaders rise up to stop global warming." *Id.* at 35. For a recent example of how popular support is being elicited on a large scale by activists and celebrities worldwide, see the home page for "Live Earth." See Live Earth on MSN: The Concerts for a Climate in Crisis, <http://entertainment.msn.com/green/leoverall/> (last visited Sept. 7, 2008). This worldwide event was held on July 7, 2007, and brought 24 hours of music and information about the threat of global warming to more than two billion people worldwide. Live Earth staged concerts in New York, London, Sydney, Tokyo, Shanghai, Rio de Janeiro, Johannesburg, Hamburg and other locations around the globe. *Id.* Live Earth drew celebrities such as the Black Eyed Peas, Bon Jovi, Cameron Diaz, Duran Duran, Genesis, Kevin Bacon, Leonardo DiCaprio, Linkin Park, Madonna, Metallica, Red Hot Chili Peppers, Shakira,

continuing coverage of the global warming crisis with varying degrees of information, explanation and alarm. Perhaps the most notable evidence of global warming reaching the appropriate level of newsworthiness occurred in April of 2007, when both *Time* and *Newsweek* carried global warming as a cover story.¹⁵ That such might indeed be the case was arguably demonstrated a short time later in 2007, when a documentary movie version of Al Gore's compelling book on the causes and consequences of

Snoop Dogg, the Police, Kayne West and far more musicians, actors, activists than it is possible to list here. *Id.* Among the most perennial activists participating were Al Gore and Robert F. Kennedy, Jr. *Id.* The entire concert was broadcast on the Internet, including Internet giant, MSN. *Id.* According to MSN statistics, more than 8 million people worldwide watched the event on the MSN feed, with a peak simultaneous viewership of 237,000, which made it "the most-watched entertainment event [in] online history." *Id.*

¹⁵ Of course, one must be careful for what one wishes. The April 9, 2007 edition of *Time* magazine, conservative, intellectually lightweight and widely read publication, featured a penguin on an iceberg on the cover. *TIME*, Apr. 9, 2007. The lead story of this edition was spelled out in large letters: "The Global Warming Survival Guide: 51 Things You Can Do to Make a Change." See Alice Park, *Global Warming: 51 Things We Can Do to Save the Environment*, *TIME*, Apr. 9, 2007, available at <http://www.time.com/time/specials/2007/environment/>. The lead story begins with this well-worn form of encouragement: "[c]an one person slow global warming? Actually, yes." *Id.* To be fair, the article does point out the need to add the efforts of scientists, businesses and governments to individual actions. *Id.* However, in this author's opinion, the publication of such admittedly "feel-good," "you can do it" exhortations to individual lifestyle changes are a subtle propaganda device to urge individuals to use their energies on minor, personal acts that have no chance of stopping or mitigating global warming, rather than urging individuals to put pressure on the immensely powerful and highly polluting corporations, which is the only way to achieve the scale of mitigation which will be necessary to ratchet downward the coming dire effects of global warming. Just as such articles deflect attention from the major culprits of global warming, the enormous interlocking corporations that dominate human institutions on this planet, they likewise deflect attention from the governmental entities which should be regulating the corporations, but instead are either ignoring the issue, or marginalizing it. A far better example of coverage of the global warming crisis in the popular press appeared the same week in *TIME* magazine's perennial competitor, *NEWSWEEK*. *Save the Planet -- Or Else*, *NEWSWEEK*, Apr. 16, 2007. Featuring a flattering, and unabashedly political, cover image of California governor Arnold Schwarzenegger spinning a model of Earth on his finger, *NEWSWEEK*'s issue carried far more information about the global warming crisis than did *TIME*, and eschewed *TIME* magazine's feel-good endings in favor of strong calls to action. Surprisingly, as this article goes to press, *TIME* has redeemed itself as a credible global warming news source with its publication of a special global warming book. See generally EDITORS OF *TIME* MAGAZINE, *GLOBAL WARMING -- THE CAUSES, THE PERILS, THE POLITICS—AND WHAT IT MEANS FOR YOU* (Time Home Ent. 2007). This remarkable and lavish publication is 122 pages long and filled with a remarkable assemblage of photographs of global warming phenomena, ranging in character from the visually beautiful to the disturbing and even tragic, with understandable and helpful charts and accessible, illuminating text. See generally *id.* While *TIME* may, to some extent, still be charged with greenwashing, the overall message of the issue was sufficiently dire and challenging to represent accurate and credible reporting of humanity's greatest disaster. See generally *id.*

global warming, titled "An Inconvenient Truth," won an Oscar for best documentary.¹⁶ Also bearing the title "An Inconvenient Truth," the movie was forgivingly autobiographical and was based upon the remarkable slide show of pre and post-global warming photographs, which Mr. Gore has literally shown around the entire planet. Another quantum leap on the way to a collective global epiphany sufficient to generate the immense and immediate social, political, and scientific efforts which will be required to mitigate the overall effects of global warming occurred when Mr. Gore received the Nobel Prize for which he had been nominated for his work on global warming, global awareness of climate change and the immediacy of its threat.¹⁷

Such examples of coverage of global warming issues in the popular press are a welcome change from the preceding journalistic vacuum of discussion. This bodes well for increasing awareness of the problem, hopefully leading to the rapid and worldwide counteraction that is needed. In the meantime, for the more serious reader, the publication of numerous scientific treatises, often in highly organized formats underpinned by elaborate long-term schedules, has continued unflaggingly. These publications bear the imprimaturs of highly credible and international organizations such as the United Nations Foundations, Sigma Xi: The Scientific Research Society, The Intergovernmental Panel on Climate Change, The Millennium Ecosystem Assessment, and IUCN - The World Conservation Union. Particularly noteworthy is the publication by Great Britain of the *Stern Review*.¹⁸ As noted in the *Stern Review*, "[t]he scientific evidence

¹⁶ See Steve Gorman, *Gore's "Inconvenient Truth" Wins Documentary Oscar*, REUTERS, (Feb. 26, 2007) available at <http://www.reuters.com/article/gc03/idUSN2522150720070226> (explaining that Gore's film won Academy Awards for best documentary feature and best song).

¹⁷ See *Gore Wins Nobel Peace Prize*, *supra* note 5, (noting that Mr. Gore used the attention generated from winning the Nobel Peace Prize to further publicize his belief that "global warming is 'the greatest challenge we've ever faced'").

¹⁸ See NICHOLAS STERN, *THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW* (Cambridge University Press 2007), available at http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm. Of monumental importance in the publication of documents capable of creating an international popular and scientific consensus on global warming was the recent hardcover publication by the British government of *THE STERN REVIEW*. *Id.* This approximately 600-page report may ultimately be one of the key documents in bringing about the global paradigm shift that will be necessary to minimize the impacts of global warming. The extraordinary thoroughness of *THE STERN REVIEW* makes it absolutely clear that global warming is a reality and if left unchecked will lead to disastrous consequences for all of

humanity. *Id.* Additionally, the fact of its official publication by the government of Great Britain further emphasizes the vast importance of this document. Already available in paperback, this tome should be on the bookshelves of everyone who cares about this planet.

Additional landmark publications on the global warming crisis have appeared as this article goes through the editing process and more can be expected as this article goes to press. In February 2007, for example, the Intergovernmental Panel on Climate Change (frequently referred to as the "IPCC") approved the IPCC Working Group I's collaborative publication. See generally CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS (Cambridge University Press 2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf>. Although this document is merely a summary of what is to come from the IPCC's first working group, it has been heralded as the most scientifically confident and unequivocal statement of anthropogenic causes of global warming and of the dire consequences they portend. Perhaps the most concise and gloomy declaration regarding the importance of this publication states: "[a]s for the bad news in the report, it confirms that the battle to prevent global warming has been lost. Now the race to survive it has begun." Mark Hertsgaard, Commentary, *Killer Weather Ahead*, THE NATION, Feb. 26, 2007, at 5.

What this author, and likely many other people, expected to be an even more dire, frightening, and historical publication from the IPCC was Working Group II's summary report. See generally CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY (Cambridge University Press 2007), available at <http://www.ipcc.ch/ipccreports/ar4-wg2.htm>. Because Working Group II's charge is to analyze impacts, adaptation and vulnerability, it fairly informs us of how really bad things may get "on the ground." *Id.* Notably, this is the so-called "Fourth Assessment" report of the IPCC and therefore a culmination of approximately fifteen to twenty years of analysis regarding the scientific literature on global warming ("assessments" are conducted at five-year intervals). Although this document contained a number of gloomy predictions, particularly for the poor in third world countries, this author believes that the summary was highly watered down and represents a politically driven compromise on a word-for-word basis. For example, even a conservative college town newspaper, carrying a LOS ANGELES TIMES story on the summary report, declared that "[b]ut despite the harshness of its vision, the report quickly was criticized by scientists who said its findings were watered down at the last minute by government bureaucrats seeking to deflect calls for action." Alan Zarembo & Thomas Maugh II, *U.N. Report Presents Harsh View of Warming*, THE REGISTER-GUARD, Apr. 7, 2007, available at http://rgweb.registerguard.com/news/2007/04/07/a1.warming.0407.p1.php?section=nation_world.

As this article goes to press, all three of the IPCC Working Groups have issued their complete Fourth Assessment Reports, which are required reading for anyone working on issues relating to global climate change. See CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS; CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, & H.L. Miller eds., Cambridge University Press 2007); CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY; CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden & C.E. Hansen eds., Cambridge University Press 2007); CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE. CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer eds., Cambridge University Press 2007).

Another landmark publication which was presented in New York on February 27, 2007 (almost to the day of the announcement of the availability of the IPCC's Working Group I

is now overwhelming: climate change is a serious global threat, and it demands an urgent global response.”¹⁹

D. *We Have Met the Enemy and He is Us*

If such a collective epiphany should occur, it cannot arrive a

summary) was the final report on climate change of Sigma Xi, the international honor society of science and engineering, prepared for the United Nation's Department of Economic and Social Affairs. ROSINA BIERBAUM, ET AL., CONFRONTING CLIMATE CHANGE: AVOIDING THE UNMANAGEABLE AND MANAGING THE UNAVOIDABLE (Sigma XI 2007), available at http://www.unfoundation.org/files/pdf/2007/SEG_Report.pdf. The conclusion of the Executive Summary, announced in bold letters, could not be more clear or more urgent: “The Time for Collective Action is Now. . . . Humanity must act collectively and urgently to change course through leadership at all levels of society. There is no more time for delay.” *Id.* at xviii.

The Millennium Ecosystem Assessment [hereinafter MEA] also published a landmark magnitude report written for and distributed to an international audience. See generally ECOSYSTEMS AND HUMAN WELL-BEING: BIODIVERSITY SYNTHESIS (World Resources Institute 2005), available at <http://www.millenniumassessment.org/documents/document.354.aspx.pdf>. The MEA is an international work program designed to meet the needs of decision makers and the public for scientific information concerning the consequences of ecosystem change for human well being and options for responding to those changes. *Id.* at 1. The MEA was launched by U.N. Secretary-General Kofi Annan in June 2001 and was completed in March 2005. *Id.* It will help to meet assessment needs of the Convention on Biological Diversity, Convention to Combat Desertification, the Ramsar Convention on Wetlands, and the Convention on Migratory Species, as well as needs of other users in the private sector and civil society. *Id.*

As in the world of print and internet publications, in the context of environmental litigation, a likewise notable milestone in the growing recognition of, and response to, global warming was the recent oral argument before the United States Supreme Court in the case of *Mass. v. Envtl. Prot. Agency* on November 29, 2006, Transcript of Oral Argument, 127 S. Ct. 1438 (2007) (No. 05-1120), available at http://www.supremecourtus.gov/oral_arguments/argument_transcripts/05-1120.pdf. Although a discussion of the issues in this case is beyond the scope of this article, in a nutshell, the state of Massachusetts sought relief compelling the EPA to engage in rulemaking and enforcement action to combat the causes and effects of global warming. *Id.* at 3-4.

¹⁹ STERN, *supra* note 18, *Summary of Conclusions*, at vi, available at http://www.hm-treasury.gov.uk/media/3/2/Summary_of_Conclusions.pdf. As this article works its way to press, media coverage of global warming is increasing. Had this happened ten years earlier, the reporting would have been quite different; however, at this late date, global warming related publications are increasingly dire. The following are selected examples of recent global warming related missives and publications of note: Andrew C. Revkin, *Analysts See ‘Simply Incredible’ Shrinking of Floating Ice in the Arctic*, N.Y. TIMES, Aug. 10, 2007, at A6. “The area of floating ice in the Arctic has shrunk more this summer than in any other summer since satellite tracking began in 1979, and it has reached that record point a month before the annual ice pullback typically peaks, experts said yesterday.” *Id.* *Global Warming Gases Set to Rise by 57 Percent by 2030*, AFP, Nov. 7, 2007, available at <http://afp.google.com/article/ALeqM5hY-tyI7m9GWzIERYvX2H0IqaLBg>. “Emissions of greenhouse gases will rise by 57 percent by 2030 compared to current levels, which will increase the Earth's surface temperature by at least three degrees Celsius (5.4 degrees Fahrenheit), the International Energy Agency (IEA) said on Wednesday.” *Id.*

moment too soon. It is beyond any reasonable doubt that our individual and collective addictions to greenhouse gas producing lifestyles have already launched us on a trajectory towards global climatic disaster. Moreover, humanity's conduct and its effects on the complex feedback loops of the planetary systems have accelerated our progress on that trajectory.²⁰ The ultimate disaster, and all the bumps along the way, will dramatically affect all species on earth, including our own.²¹ And, except for that portion of

²⁰ See, e.g. Science Daily, *Feedback Loops in Global Climate Change Point to a Very Hot 21st Century*, May 22, 2006, <http://www.sciencedaily.com/releases/2006/05/060522151248.htm> (reporting that new studies conducted by researchers at the Lawrence Berkeley National Laboratory and the University of California Berkeley show how human "anthropogenic" greenhouse gas emissions alter Earth's feedback loops, resulting in the acceleration of global warming).

²¹ See Jeffrey D. Sachs, *Ecology and Political Upheaval*, SCI. AM., July 2006, at 37. "Small changes in climate can cause wars, topple governments and crush economies already strained by poverty, corruption and ethnic conflict." *Id.* Andrew Simms, *Environment: Hellfire and High Water: Climate Change in Africa*, THE AFRICA REPORT, Jan. 2007, at 36. Global climate warming induced desertification "could be potentially devastating for the continent. New research programmes modelling the future of global drought patterns has genuinely terrifying implications for human survival." *Id.* Robert T. Watson, *Climate Change: The Political Situation*, SCIENCE MAGAZINE'S STATE OF THE PLANET 2006-2007 179 (Island Press 2006). "The overwhelming majority of scientific experts and governments acknowledge that human activities are changing the Earth's climate and that further change is inevitable. Changes in the Earth's climate are projected to adversely affect socioeconomic systems (such as water, agriculture, forestry, and fisheries), terrestrial and aquatic ecological systems, and human health." *Id.* Thomas Homer-Dixon, Michael Klare, Sherrie Goodman & Paul Kern, *The World is Not Enough*, THE NAT'L INTEREST, Jan./Feb. 2008 at 25. Resource stress, combined with ecological change, can have far reaching impact on the earth and humanity, including contributing to war. *Id.* See generally Eric Wagner, *The Heat of Battle: Historical Climate Changes Linked to War and Famine*, CONSERVATION, Jan./Mar. 2008. Historically, there is a link between shortages of resources that can result from climate change, and war. *Id.* See also John Young, *Black Water Rising: The Growing Global Threat of Rising Seas and Bigger Hurricanes*, WORLD WATCH, Sept./Oct. 2006, at 31. "In the end, the most obvious implication of the threats from sea-level rise and stronger hurricanes is that the costs of global warming are real, huge, and unpredictable. By not acting to avoid future climate change, we are making explicit sacrifices of our coastal assets and putting residents of such areas at major long-term risk." *Id.* For an extended discussion of some potential impacts global warming could have on agriculture, see SETH G. PRITCHARD & JEFFREY S. AMTHOR, CROPS AND ENVIRONMENTAL CHANGE: AN INTRODUCTION TO EFFECTS OF GLOBAL WARMING, INCREASING ATMOSPHERIC CO₂ AND O₃ CONCENTRATIONS, AND SOIL SALINIZATION ON CROP PHYSIOLOGY AND YIELD, at 37 (Haworth Press 2005). For a dated, but nevertheless relevant and sophisticated read on the implications of global climate change for agriculture and human societies, see also HARRY KAISER & THOMAS DRENNEN, AGRICULTURAL DIMENSIONS OF GLOBAL CLIMATE CHANGE (1993). For the insurance industry's take on global warming, see J.R. Minkel, *Swiss Re.*, SCI. AM., Dec. 2006, at 50-51; *New Report Warns of Rising Threat to Industry from Climate Change*, INSURANCE JOURNAL, Sept. 8, 2005, available at <http://www.insurancejournal.com/news/national/2005/09/08/>

59279.htm?print=1. For a comprehensive region-by-region and impact-by-impact report on the predicted impacts of global climate change on the United States, see CLIMATE CHANGE IMPACTS ON THE UNITED STATES – FOUNDATION REPORT: THE POTENTIAL CONSEQUENCES OF CLIMATE VARIABILITY AND CHANGE (Cambridge University Press 2001); see also TOM ATHANASIOU & PAUL BAER, DEAD HEAT: GLOBAL JUSTICE AND GLOBAL WARMING (Seven Stories Press 2002); LESTER R. BROWN, OUTGROWING THE EARTH: THE FOOD SECURITY CHALLENGE IN AN AGE OF FALLING WATER TABLES AND RISING TEMPERATURES (W. W. Norton & Co. 2004); JOHN FIROR & JUDITH JACOBSEN, THE CROWDED GREENHOUSE: POPULATION, CLIMATE CHANGE, AND CREATING A SUSTAINABLE WORLD (Yale University Press 2002); JEREMY LEGGETT, THE EMPTY TANK: OIL, GAS, HOT AIR, AND THE COMING GLOBAL FINANCIAL CATASTROPHE (Random House 2005). For a more recent, and more ominous, pronouncement on the effects of global warming on humanity, see, e.g., Steve Conner, *The Earth Today Stands in Imminent Peril*, THE LONDON INDEPENDENT, June 19, 2007, available at <http://www.independent.co.uk/environment/climate-change/the-earth-today-stands-in-imminent-peril-453708.html>. "Six scientists from some of the leading scientific institutions in the United States have issued what amounts to an unambiguous warning to the world: civilization itself is threatened by global warming."

Ironically, not all of us, in particular the oil industry, see global warming as a bad thing. As scientific certainty regarding global warming has reached the point of irrefutability, many of the world's largest oil companies have launched expensive public relations campaigns touting their efforts to reduce dependence upon fossil fuels and to otherwise combat global warming. However, a number of these same companies see the melting of polar ice caps as an opportunity to set up oil drilling rigs in land and ocean locations that were previously inaccessible due to the presence of thick layers of ice. Not only will drilling for oil in formerly snow and ice covered portions of the Arctic result in the production of more fossil fuels that, when consumed, will contribute further to global warming, the very act of oil exploration in these newly ice-free regions will add to global warming by releasing the greenhouse gas methane. See Joshua Kurlantzick, *What Lies Beneath*, THE AMERICAN PROSPECT, Nov. 2006, at 26. A perhaps more ecologically benign, but equally ironic, commercial exploitation of global warming comes in a report that beer brewers in Greenland are developing a market for beer brewed with melted arctic ice. The product, called Greenland Beer, is brewed by indigenous Greenlanders located some 390 miles south of the Arctic Circle in what is described as the world's "first Inuit microbrewery." Blake de Pastino, *Photo in the News: "Global Warming Beer" Taps Melted Arctic Ice*, NAT'L GEOGRAPHIC NEWS, Aug. 3, 2006, <http://news.nationalgeographic.com/news/2006/08/060803-warming-beer.html>. Perhaps the most ironic, opportunistic or adaptive response, depending upon one's point of view, was the publication in 2001 of a book on how to live well in the age of global warming. See PAUL A. DELCOURT & HAZEL R. DELCOURT, LIVING WELL IN THE AGE OF GLOBAL WARMING: 10 STRATEGIES FOR BOOMERS, BOBOS, AND CULTURAL CREATIVES (Chelsea Green Publishing Company 2001). For a global scale analysis of economic and lifestyle winners and losers in a climate changed world, see Gregg Easterbrook, *Global Warming: Who Loses--and Who Wins?*, THE ATLANTIC MONTHLY, Apr. 2007, at 56. "Soon, both abstraction and postapocalyptic fantasy could be pushed aside by the economic and political realities of a warming world. If the global climate continues changing, many people and nations will find themselves in possession of land and resources of rising value, while others will suffer dire losses -- and these winners and losers could start appearing faster than you might imagine." For a first-hand description of the Canadian "sovereignty operation" titled Operation Lancaster, the stated purpose of which was to "project a credible size military force over a broad area of the Eastern Arctic," demonstrating that governments, like corporations, want a piece of the action in taking advantage of economic opportunities of thawed out arctic, see McKenzie Funk, *Cold Rush: The Coming Fight for the Melting North*, HARPERS MAGAZINE, Sept.

the coming scenario that can be attributed to the inherent instability in the Earth's climate, it is we who are pushing the climate past its "tipping-point."²² As the comic strip character Pogo famously said on Earth Day in 1970, "[w]e have met the enemy and he is us."²³

E. Adapt, Migrate or Die

Humanity must now accept as axiomatic that as we heat up our planet by discharging prodigious amounts of greenhouse gases into the atmosphere, climates will change, creating enormous challenges for virtually all plant and animal life, including microscopic life. A succinct description of what these challenges will entail for life on this planet may be found in the acronym: AMD ("adapt, migrate or die"). A mere smidgen of understanding of what the AMD scenario will entail for life on this planet is all that is needed to see that continuation of the BAU ("business as usual") mode is *not* an option. Where consensus is lacking is in interpretation of the underlying data and in the use of models that will be necessary to predict the details, scale and timing of the imminent series of catastrophes that await us, and precisely how to respond to them in a timely and effective fashion.

Obviously, both the micro and macro level changes of plant and animal life caused by global warming represent tremendous challenges for the national and global land trust communities and their use of conservation easements to protect species and the natural features and landscapes which they inhabit. Complicating matters further, global warming is but one of many planetary

2007, at 45. See also, Ben Jervey, *The Market is Heating Up: Savvy Speculators Cash in as the World Burns*, GOOD, May/June 2007, at 64 available at, http://www.goodmagazine.com/section/Features/the_market_is_heating_up_. Jervey suggests that there "[t]his is not to say that anyone is rooting for global warming -- and, in fact, all related studies show the economic toll of global warming to be far weightier than its possible benefits -- but some savvy businesses are recognizing the practical realities of a planet in transition. And, it turns out, the smart money is on rising mercury." *Id.*

²²See *supra* notes 2-4 (documenting evidence of global warming); FRED PEARCE, WITH SPEED AND VIOLENCE: WHY SCIENTISTS FEAR TIPPING POINTS IN CLIMATE CHANGE xxiv (Beacon Press 2007). "Global 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 depredations of humans, it lurches -- virtually overnight." *Id.*

²³ Walt Kelly, *We Have Met the Enemy and He Is Us*, Igo Pogo, http://www.igopogo.com/we_have_met.htm (preserving and celebrating the cartoonist Walt Kelly's legacy of the political and satirical "Pogo" cartoon series).

scale changes that we face today and which will confront us in the future with even greater ferocity. Overpopulation, social and economic disruption,²⁴ increases in air and water pollution, urban sprawl,²⁵ depletion of non-renewable resources and loss of biodiversity²⁶ represent only a partial list of global problems that we, and future generations, will face. Like global warming, all of

²⁴See STERN, *supra* note 18 (asserting that global warming is "the greatest market failure the world has seen").

²⁵ Regarding the environmental implications of urban sprawl and how to combat sprawl, see generally James Olmsted, *Handling the Land Use Case: A User's Manual for the Public Interest Attorney*, 19 J. ENVTL. L. & LITIG. 23 (2004). For a thoughtful, deeply researched and scientific compendium of articles addressing the effects of sprawl on biodiversity, see generally ELIZABETH A. JOHNSON & MICHAEL W. KLEMENS, *NATURE IN FRAGMENTS: THE LEGACY OF SPRAWL* (Columbia University Press 2005). For a prescient scientific and technical discussion of the direct causes of land use on global warming, see generally W. NEIL ADGER & KATRINA BROWN, *LAND USE AND THE CAUSES OF GLOBAL WARMING* (John Wiley & Sons 1994). Other worthwhile books decrying sprawl include: ANTHONY FLINT, *THIS LAND: THE BATTLE OVER SPRAWL AND THE FUTURE OF AMERICA* (Johns Hopkins University Press 2006); JOEL S. HIRSCHHORN, *SPRAWL KILLS: HOW BLANDBURBS STEAL YOUR TIME, HEALTH AND MONEY* (Sterling & Ross Publishers 2005); and DOUGLAS E. MORRIS, *IT'S A SPRAWL WORLD AFTER ALL: THE HUMAN COST OF UNPLANNED GROWTH -- AND VISIONS OF A BETTER FUTURE* (New Society Publishers 2005). For a slightly brighter, if dated, picture, see RANDALL G. G. ARENDT, *CONSERVATION DESIGN FOR SUBDIVISIONS: A PRACTICAL GUIDE TO CREATING OPEN SPACE NETWORKS* (Island Press 1996). See also Francesca Ortiz, *Biodiversity, the City, and Sprawl*, 82 B.U. L. REV. 145 (2002).

²⁶ For comprehensive and compelling discussions of the nature, value and relationship to humanity of biodiversity, read the following two works by the Pulitzer Prize winning author and biologist Edward O. Wilson: EDWARD O. WILSON, *THE DIVERSITY OF LIFE* (W. W. Norton & Co. 1999) (1992) and EDWARD O. WILSON, *BIOPHILIA: THE HUMAN BOND WITH OTHER SPECIES* (Harvard University Press 1984). For a lavish compilation of deeply researched assessments of biodiversity in the United States, see *PRECIOUS HERITAGE: THE STATUS OF BIODIVERSITY IN THE UNITED STATES* (Bruce A. Stein, Lynn S. Kutner & Jonathan S. Adams eds., Oxford University Press 2000). For a comprehensive and detailed approach to protecting biodiversity at the ecosystem level, see, e.g., DAVID B. LINDENMAYER & JERRY F. FRANKLIN, *CONSERVING FOREST BIODIVERSITY: A COMPREHENSIVE MULTISCALED APPROACH* (Island Press 2002). Regarding the protection of biodiversity at the species level, the most endangered species, and thus those most needing our protection from the harms caused by climate change, are typically the larger mammalian species, including such "charismatic mega-fauna" as the giant panda, the polar bear and the mountain gorilla. Nevertheless, we must remind ourselves that biodiversity exists and must be preserved across all species, whether plant, mammal, reptile, insect, fish, mollusk or microbe. Regarding the protection of biodiversity among some of the Earth's less charismatic, but perhaps even more fascinating creatures, see, e.g., MICHAEL J. SAMWAYS, *INSECT DIVERSITY CONSERVATION* (Cambridge University Press 2005); Panos V. Petrakis & Anastasios Legakis, *Insect Migration and Dispersal with Emphasis on Mediterranean Ecosystems*, in *MIGRATION OF ORGANISMS: CLIMATE, GEOGRAPHY, ECOLOGY* 85 (Ashraf M. T. Elewa ed., 2005). In particular, note section 5.8, beginning on page 107 and titled "How Insects Face Global Climate Change?" *Id.*

these mega-trends²⁷ will force plant and animal species to adapt, migrate or die.²⁸

I. CLIMATE SURFING

A. "Harm, Widespread and Grave"

The possibility that greenhouse gases escaping into the atmosphere, as a result of coal burning during the industrial revolution could cause global warming was first suspected, and scientifically demonstrated, in 1895 by the Swedish chemist Svante Arrhenius.²⁹ However, more than half a century passed before scientists began earnestly assembling the scientific evidence of such greenhouse gas induced global warming. In 1958, chemist Charles David Keeling began annual measurements of CO₂ on the side of Hawaii's Mauna Loa Mountain. These measurements, which have been taken almost continuously from 1958 to the present, form the famous "Keeling Curve," an irrefutable graphic demonstrating that CO₂ levels in the earth's atmosphere have been rising steadily each year that records have been kept, and continue to do so.³⁰ When the Keeling Curve and data similarly demonstrating steadily increasing concentrations of greenhouse gases in the earth's atmosphere since the beginning of the industrial age are combined with global temperature records, a startling picture emerges: the more greenhouse gases we discharge into the atmosphere, the warmer our planet becomes and the more our climates change. Of course, neither these cause and effect mechanisms, nor their consequences were well understood at first.

Arrhenius actually considered the human-induced warming of the earth's climate a "salubrious" event—not only would a warmer climate be more comfortable for humanity; it would also pro-

²⁷ See, e.g., Michael Specter, *The Last Drop: Confronting the Possibility of a Global Catastrophe*, THE NEW YORKER, Oct. 23, 2006, at 61 (describing the importance of water and India's struggle to obtain adequate amounts of water).

²⁸ For an overview of case studies on the effects of climate change on North American wildlife, see MARK VAN PUTTEN, WILDLIFE RESPONSES TO CLIMATE CHANGE: NORTH AMERICAN CASE STUDIES (Stephen H. Schneider & Terry L. Root eds., Island Press 2001).

²⁹ KOLBERT, *supra* note 5, at 39-42 (detailing the development of Arrhenius's work and his early conclusions).

³⁰ *Id.* at 42-44 (explaining Keeling's measurement system and its results).

duce more abundant crops.³¹ With the advent of a more sophisticated understanding of the earth's climate and its interaction with other global systems such as ocean currents and the polar ice caps, the build-up of greenhouse gases began to take on decidedly ominous implications.³² We began to understand that the earth's climate was not immutable and that increased concentrations of greenhouse gases could not only affect it, but could do so profoundly. Nevertheless, there persisted the widespread belief that humanity was so puny in comparison to the immensity of nature that the possibility of human-induced global changes was something of an absurdity. Even if humanity could mount such forces, the general public, and even some scientists, clung to the comforting notion that when it came to climate change we were operating at the rate of "geological time." Stated simply, geological time is the concept that major global changes such as the erosion of deep river channels, the formation and movement of glaciers and the up-thrust of mountain ranges take millennia to play out. In other words, changes of a global scale tend to be temporally moderate and incremental, offering ingenious species such as homo sapiens plenty of time either to adapt to, or to "fix" problems such as global warming.³³

Unfortunately, global climate changes do not necessarily follow the slow ticking of a geological metronome. In fact, it is now known that global climate change can occur quite *abruptly*.³⁴ Scientists studying ice cores drawn from central Greenland recently discovered that "Earth has experienced large, *rapid*, regional to global climate oscillations through most of the last

³¹ *Id.* at 42 (providing Arrhenius's conclusion that climate warming would result in more equable and better climates).

³² *See id.* at 131 (noting that "insider" climate scientists are now alarmed by the implications current emission trends hold for the global climate); *see also, supra* notes 2-3.

³³ *See* FLANNERY, *supra* note 5, at 45-53 (explaining the evolution of conditions on Earth during different divisions of geological time); DISCOVERY OF GLOBAL WARMING, *supra* note 3, at 9-19 (recounting various theories of climate change from throughout history); CLIMATE CRASH, *supra* note 5, at 67-74 (suggesting that climate change theories change with the availability of new data forms).

³⁴ *See* COX, *supra* note 5, at 109, 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." *Id.* (emphasis added) *See also* PEARCE, *supra* note 22 at xxiv. "Nature is strong and packs a serious counterpunch. It's revenge for man-made global warming will very probably unleash unstoppable planetary forces. . . . The history of our planet's climate shows that it does not do gradual change." *Id.*

110,000 years on a scale that human agricultural and industrial activities have not yet faced.”³⁵ On the heels of this breathtaking revelation regarding the frequency and abruptness of climate change, a veritable army of scientists from various fields has begun piecing together a new picture of the Earth’s history and the probable behavior of future global climate patterns. Core samples have been taken from Arctic and Antarctic ice masses, oceanic and terrestrial temperature and weather records have been analyzed, and complex models have been run endlessly on supercomputers. The result of this enormous enterprise has been a remarkable and ominous scientific consensus.³⁶

It is now a matter of scientific certainty that DAI (“dangerous anthropogenic interference”) has already set the mechanisms of global warming in motion. Furthermore, because of the complex feedback loops and interactive global systems that interact with climate locally and globally, many major climate changes can be expected to occur with breathtaking abruptness.³⁷ Ironically, global warming induced climate change is already occurring with a fearsome rapidity at the poles, where the indigenous peoples who carry out their subsistence lifestyles are painfully aware of the alterations to their daily lives wrought by rapid climate change.³⁸ Spencer R. Weart, a climate science historian, best sums up the immediacy of the problem and the need for quick and decisive action: “[I]t is *very likely* that significant global warming is coming *in our lifetimes*. This surely brings a likelih-

³⁵ COX, *supra* note 5 at 127 (emphasis added).

³⁶ See GORE, *supra* note 5, at 262. “About a quarter of the articles in the sample dealt with aspects of global warming that did not involve any discussion of the central elements of the consensus. Of the three-quarters that did address these main points, the percentage that disagreed with the consensus? Zero.” *Id.* See also, Kenneth Berlin, *Arresting Climate Change*, SL098 ALI-ABA 79 (2006):

The World Resources Institute (“WRI”) recently wrote that “2005 was a year in which scientific discoveries and new research on climate change confirmed the fears of the science community. The findings reported in peer-reviewed journals last year point to an unavoidable conclusion: the physical consequences of climate change are no longer theoretical; they are real, they are here and they can be quantified.

Id.

³⁷ See ARCTIC MELTING, *supra* note 5, at 94-96 (describing the process by which global warming causes further warming).

³⁸ See generally GORE, *supra* note 5 (containing a remarkable series of “before and after” photographs vividly demonstrating the currently ongoing retreat of glaciers, melting of polar ice caps, and desertification); ARCTIC MELTING, *supra* note 5 (describing how changes are occurring even more rapidly at the poles).

ood of harm, widespread and grave.”³⁹

B. Chasing Isotherms

Because those of us in the industrialized nations have thermostats, or other means to easily control our immediate environment, we have yet to feel the daily effects of global climate change.⁴⁰ Earth's other inhabitants—whether plants, animals, birds, insects, fish or microbes—are hardly so fortunate. Virtually all of earth's creatures are adapted to a specific climate zone. Even forms of microbial life are adapted to specific climate zones. Indeed, scientists often define climate zones based on the types of plants and animals that inhabit them.⁴¹ Likewise, gardeners, bird watchers, and other observers of nature, are well aware of the specialized relationships between plants and animals and their natural habitats. This knowledge is reflected in the handbooks of bird and plant watchers, which contain maps of the zones in which various plant or animal species can be found.⁴² Even the terms “flora” and “fauna” refer to plants and animals found in a specific region or area.⁴³

To use one rather technical, but highly compelling, example of how closely connected a given species may be to a specific location is to examine the relationship between the species' phenological characteristics and its natural environment. Stated simply: Phenology is the study of periodic biological events in the animal

³⁹ DISCOVERY OF GLOBAL WARMING, *supra* note 3, at 199 (emphasis added).

⁴⁰ See Hansen, *supra* note 5, at 12 (asserting that most people, who have other things on their minds and thermostats to regulate temperature, barely notice that the climate is changing).

⁴¹ See 1 ENCYCLOPEDIA OF CLIMATE AND WEATHER 144-45 (Stephen H. Schneider ed., Oxford University Press 1996) (discussing the evolution of classifying climate zones); Muyin Wang & James E. Overland, *Detecting Arctic Climate Change Using Köppen Climate Classification*, 67 CLIMATIC CHANGE 43-44 (2004) (summarizing Köppen's widely accepted climate classification system based on vegetation).

⁴² See BILL THOMPSON III, BIRD WATCHING FOR DUMMIES 251 (For Dummies 1997) (describing bird watching based on bird habitat); see also Oregon Env'tl. Counsel, *How to Grow a "Cool Planet" Garden*, <http://www.oeonline.org/climate/gwgardening> (noting the National Arbor Day Foundation's recent update to its hardiness zone map reflecting recent climate trends caused by global warming and also noting that Duke University researchers have discovered that higher levels of carbon dioxide cause noxious weeds to grow faster and produce more toxins).

⁴³ See MERRIAM-WEBSTER ONLINE DICTIONARY, <http://www.m-w.com/flora> (last visited July 16, 2006); MERRIAM-WEBSTER ONLINE DICTIONARY, <http://www.m-w.com/fauna> (last visited July 16, 2006).

and plant world as influenced by the environment, especially temperature changes driven by weather and climate. "Sprouting and flowering of plants in the spring, color changes of leaves in the fall, bird migration and nesting, insect hatches, and animal hibernation are examples of phenological events."⁴⁴

Because phenology is related to "seasonality," a non-biological term associated with climate, the study of a species' phenological characteristics is a logical way to examine that species' relationship to the climate of its natural habitat.⁴⁵ In this regard, it is easy enough to imagine how climate changes may create phenological "disconnects" for various species. For example, climate changes may affect flowering phenology (i.e., timing of flowering). Warmer temperatures may cause plants to flower earlier in the year. Without a similar change to the phenology of pollinators, such as insects and bats, the pollinators' life cycles may suffer critical disruptions. Such disruptions of the life cycles of the pollinators can create feedback loops, which cause further harm to the flowering species.⁴⁶ Such disconnects in turn may result in one or more of the affected species beginning a pole-ward migration in search of more habitable climates, depending, of course, upon its mobility. Because species are adapted to particular climates, when those climates change, as is already happening, individual species must adapt, migrate or die.

Regarding adaptation, we have little scientific data on how rapidly plant and animal species can modify their behavior or alter their genetic make-up to adapt to dramatically different environments.⁴⁷ Although the science of species adaptation is beyond

⁴⁴ PHENOLOGY: AN INTEGRATIVE ENVIRONMENTAL SCIENCE 3 (Mark D. Schwartz ed., Kluwer Academic Publishers 2003).

⁴⁵ See *id.* See also Johan P. Dalhgren, Hugo Von Zeipel, & Johan Ehrlen, *Variation in Vegetative and Flowering Phenology in a Forest Herb Caused by Environmental Heterogeneity* 94(9) AM. J. BOTANY 1570 (2007) (noting the "evidence of flowering time being strongly influenced by climate . . .").

⁴⁶ See Elizabeth Kolbert, *Stung: Where have all the bees gone?*, THE NEW YORKER, Aug. 6, 2007, 56 (chronicling the mysterious disappearance of bee colonies, described as "colony-collapse disorder," and the negative consequences of this disturbing phenomenon on human enterprises such as agriculture which depend upon the services of these mighty pollinators); see also Dalhgren, *supra* note 45, at 1570 (positing that the ecosystem may be impacted by disruptions in flowering time).

⁴⁷ See Larry O'Hanlon, *Global Warming Fuels Speedy Evolution*, DISCOVERY NEWS, Feb. 22, 2006, <http://forests.org/articles/reader.asp?linkid=53157> (suggesting that there is some recent scientific evidence that certain species, such as toads, frogs, salamanders, fish, lizards, squirrels and some plants are capable of adaptation within time frames of

the scope of this article, it is unlikely that anyone would challenge the premise that the behavior of most plants and animals is instinctual, or otherwise “hard-wired,” and, therefore, resistant to any rapid change. With the exception of very short-lived species, such as mosquitoes, which can increase the probability of beneficial mutations by churning out multiple generations very quickly, most plant and animal species face the same timing problem for genetic adaptation that they do for behavioral adaptation.⁴⁸ It simply does not happen quickly enough. At the very least, genetic adaptation requires many generations of randomly occurring beneficial mutations, perhaps requiring hundreds or even thousands of years (witness homo sapiens) to produce a creature well suited to its environment.⁴⁹

Lacking the ability to adapt quickly, many plant, animal, and insect species are forced to migrate to more favorable climates. Such migrations may create a domino effect of harmful ecological changes. The absence of any given species from its “home” environment may destabilize that environment, forcing other species to adapt, migrate or die. But changes due to species migrations can be expected to cause equally harmful changes to their new environments; as invasive species, they may out-compete or otherwise destabilize the mix of species in their new locations. When the complex and interlocking relationships that species have formed with each other and their environments over eons of co-evolution are disrupted by the introduction of new, foreign species, the true fragility of earth’s ecosystems is revealed. These relationships depend crucially on the nature and timing of each species’ life cycle, but it cannot be expected that the life cycle of each species will change in complimentary ways in the

decades rather than eons; on the other hand, slowly reproducing species such as large trees can neither move nor evolve quickly).

⁴⁸ See P.J. Darlington, Jr., *Rates, Patterns and Effectiveness of Evolution in Multi-Level Situations*, 73 PROC. NAT’L ACAD. SCI. U.S. 1360, 1362 (1976) <http://links.jstor.org/sici?sici=00278424%28197604%2973%3A4%3C1360%3ARPAEOE%3E2.0.CO%3B2-Z> (postulating that larger, short lived species evolve more rapidly than small ones).

⁴⁹ See *Natural Selection*, ENCYCLOPEDIA BRITANNICA (2008), available at <http://www.britannica.com/eb/article-9055046/natural-selection> (describing that genetic adaptation requires mutations and/or hundreds/thousands of years to produce well-suited creatures); see also Margaret B. Davis, Ruth G. Shaw & Julie R. Etterson, *Evolutionary Responses to Climate Change*, 86 ECOLOGY 1704, 1704 (2005), available at <http://links.jstor.org/sici?sici=00129658%28200507%2986%3A7%3C1704%3AERTCC%3E2.0.CO%3B2-L> (stating that genetic adaptation occurs on the time-scale of millions of years).

face of climate change. Thus, it should not be surprising that disturbances to various aspects of a species' life cycle caused by climate change, for example, to its particular phenology, will force that species to adapt, migrate (usually in a pole-ward direction), or die trying.

Indeed, we know that many plant, animal and insect species are already on the run from climate change.⁵⁰ Moreover, not only are individual plant, animal and insect species on the run, so are entire ecosystems. As explained by NASA climate scientist Professor Jim Hansen, "[e]cosystems are based on interdependencies—between, for example, flower and pollinator, hunter and hunted, grazers and plant life—so the less mobile species have an impact on the survival of others."⁵¹ Thus, not only must individual species make a "run for it" to the next favorable climate zone, so must the ecosystems that support them.⁵² Of course, the path to ecological salvation may lead in the opposite way as well. Just as the emigration of individual species may force their former ecosystem to adapt to their absence or migrate, so might the prior migration of an ecosystem force those remaining hardy species to likewise adapt, migrate or die.

Regions in which a given average temperature prevails are

⁵⁰ See Hansen, *supra* note 5, at 12. If there is a phenological "poster-child" in North America, it is most likely the Bay Checkerspot butterfly. *Id.* Because of threats to the Checkerspot by invasive species, concerned conservationists first tried to save the butterfly by turning the remaining patches where it survives into reserves. *Id.* However, climate warming has rendered these reserves uninhabitable to the Bay Checkerspot. Studies of the butterfly's tenuous hold on preservation have indicated that climate change will push it to extinction when the plants it depends upon for food ultimately shift their growing seasons in response to global warming. *Id.* As a result, newly hatched butterflies will find nothing to eat. *Id.* One of the solutions contemplated to ease the global warming caused threats to the butterfly is to engage in so-called "assisted migration." *Id.* Such an intervention would involve capturing enough butterflies to create a sustainable sub-population and finding sufficiently protected habitat with a cool enough temperature for these remaining beautiful insects to survive. *Id.* See also Carl Zimmer, *A Radical Step to Preserve a Species: Assisted Migration*, N.Y. TIMES, Jan. 23, 2007, at F1 (pointing out that the San Francisco Bay Checkerspot butterfly's story is not the first time a species has moved in response to climate change, and that other species have shifted their ranges by hundreds of miles).

⁵¹ Hansen, *supra* note 5, at 12.

⁵² However, scientific opinions differ regarding the possibility of ecosystem migration. See, e.g., Thomas E. Lovejoy & Lee Hannah, *Conservation with a Changing Climate*, CLIMATE CHANGE AND BIODIVERSITY 326 (Thomas E. Lovejoy & Lee Hannah eds., Yale University Press 2005). For example, it can be argued that "[e]cosystems will not pick up and move like Birnam Wood with all constituent species in concert; rather, species will respond individualistically." *Id.*

marked on maps by lines called "isotherms."⁵³ So long as the total movement of the isotherms toward the poles remains much smaller than the size of a given species' range or habitat zone, the species is potentially unaffected.⁵⁴ As the Earth heats up, isotherms have been moving "pole-ward" at a rate of about thirty-five miles per decade.⁵⁵ By way of comparison, that is roughly the size of a typical rural county in the United States.⁵⁶ Unfortunately, studies of recent and ongoing pole-ward migration rates of over a thousand species of plants, animals and insects have revealed dire conclusions. Based upon these studies, the average migration rate to the North and South Poles in the second half of the twentieth century has been about four miles per decade.⁵⁷ Quite obviously, that is not fast enough to keep up with the much faster moving isotherms.

For those species unable to adapt or migrate in response to climate change, the only other option is species death, i.e., extinction. If we follow the BAU ("business as usual") path and greenhouse gas emissions continue at the present rate, "a large fraction of the species on Earth, as many as 50 percent or more, may become extinct."⁵⁸ "The species most at risk are those in the polar climates and the biologically diverse slopes of alpine regions."⁵⁹ Unless immediate and dramatic measures are taken to reduce our emissions of greenhouse gases and otherwise to mitigate our

⁵³ See Hansen, *supra* note 5, at 12 (stating that isotherms are the lines marking the regions in which a given average temperature prevails).

⁵⁴ See Hansen, *supra* note 5, at 12. Species are unaffected when the movement of isotherms poleward is much smaller than the size of the habitat. *Id.* See also FLANNERY, *supra* note 5, at 179. The author discusses a study of the impact of climate change on 819 species of *Eucalyptus* in Australia. *Id.* The result of this study indicated that the majority of the species occupy "small discrete regions defined by very narrow temperature zones." *Id.* In fact more than 200 species or twenty-five percent have ranges of a mere two degrees Fahrenheit. *Id.* An additional forty-one percent have ranges spanning a likewise narrow band of just 3.6 degrees Fahrenheit. *Id.* When seventy-five percent of species were considered, the range remained at less than nine degrees Fahrenheit. *Id.*

⁵⁵ See Hansen, *supra* note 5, at 12 (pointing out that during the past thirty years, isotherms have been moving poleward at a rate of about thirty-five miles per decade).

⁵⁶ See *id.* (indicating that the movement of isotherms in the past thirty-five years equals approximately the size of a county in Iowa).

⁵⁷ See *id.* (stating that the studies of various species of plants, animals, and insects found an average poleward migration rate of about four miles per decade in the second half of the twentieth century).

⁵⁸ *Id.* at 2.

⁵⁹ *Id.* at 2. See, e.g., Valerie Brown, *The Heat is on in the Northern Exposures*, FOREST MAGAZINE, Spring 2006 (noting that "[o]f all the forest regions of the world, the magnitude of climate change seems to be the greatest in the boreal forest").

collective monopolization and destruction of critical habitat, these high-risk species will, in the words of Professor Jim Hansen, "be pushed off the planet."⁶⁰ Though this article functions as both a primer and as a dire warning regarding the nature and consequences of global warming, its main goal, as expressed in the sections to come, is to explore possible mitigation measures to global warming to be employed by the land trust community, its supporters and legal counsel.

C. Roadblocks on the Path to Survival

In past abrupt climate changes, some plant and animal species were able to keep pace with the changing weather and successfully migrate to more hospitable climes. Others species, not so fortunate, likely found their migratory routes blocked by such insurmountable natural topographical features as oceans, lakes, rivers, mountain ranges and deserts. In the present abrupt climate change, migrating species will find themselves confronted with many of the same types of natural topographic obstacles faced by ancient life forms. Some of these obstacles they will overcome, and some will overcome them.

⁶⁰ See Hansen, *supra* note 5, at 12. See also KOLBERT, *supra* note 5, at 84-85. In another study of climate change induced extinction rates that took place within the past two years, a group of nineteen biologists from around the world assembled data on eleven hundred species of plants and animals from sample regions covering approximately a fifth of the earth's surface. *Id.* Based on a mid-range projection of temperature rise, the biologists concluded that if species in the sample regions were highly mobile, a full fifteen percent would nonetheless be "committed to extinction" by the middle of this century. *Id.* If the sample group proved to be essentially stationary, the extinction rate would rise to thirty-seven percent. *Id.* See also Peter D. Ward, *Impact from the Deep*, SCI. AM., Oct. 2006 at 64. "Strangling heat and gases emanating from the earth and sea, not asteroids, most likely caused several ancient mass extinctions. Could the same killer-greenhouse conditions build once again?" *Id.* Ironically, this particular issue of *Scientific American* selected as the cover story an article on what makes a star blow up, thus causing a supernova. *Id.* The much closer to home, and, therefore more dire, article on the catastrophic effects of greenhouse gases on the lowly planet Earth, lowly at least when compared to a supernova, was relegated to approximately the second half of this issue. See *id.* For additional works addressing mass extinctions on Earth from various perspectives, including paleontological, historical, philosophical and ethical, see generally FREDERIC L. BENDER, *THE CULTURE OF EXTINCTION: TOWARD A PHILOSOPHY OF DEEP ECOLOGY*, (Humanity Books 2003); FRANZ J. BROSCHWIMMER, *ECOCIDE: A SHORT HISTORY OF THE MASS EXTINCTION OF SPECIES* (Pluto Press 2002); RICHARD ELLIS, *NO TURNING BACK: THE LIFE AND DEATH OF ANIMAL SPECIES* (HarperCollins 2004); MARTIN GORKE, *THE DEATH OF OUR PLANET'S SPECIES: A CHALLENGE TO ECOLOGY AND ETHICS* (Patricia Nevers, trans., Island Press 2003).

Today's species, however, will face a far more daunting array of obstacles to migration, for in addition to natural obstacles; they must also face the vast array of human-made barriers. So inventive, industrious and successful have humans been in conquering the entire planetary environment that it is impossible to list in this article all such barriers. However, a representative sample of the roadblocks to survival we have constructed would include our numerous and sprawling cities, our nation-wide system of highways and the automobiles that travel them at high speeds both day and night, our dams, reservoirs and canals, our great expanses of open and shelter-less agricultural fields, our enormous open pit mines and our fragmented and otherwise ecologically impaired clear-cut forests.⁶¹ Whether we have by careful conservation planning left sufficient migration corridors, road-less areas and "rest stops" in the form of protected natural areas to assist those species racing to keep up with the faster moving isotherms is doubtful.⁶² Consequently, today's climate change in-

⁶¹ See Lovejoy & Hannah, *supra* note 52, at 325-26. "The impact of climate change in this heavily fragmented world may be immense. In many instances, species will no longer be able to adjust their ranges to track changing climatic conditions. Implications of this reduced response may include genetic impoverishment or extinction. . . ." *Id.*

⁶² For an extended discussion of how we might mitigate the myriad obstacles to migration we have created, see ANTHONY B. ANDERSON & CLINTON N. JENKINS, *APPLYING NATURE'S DESIGN: CORRIDORS AS A STRATEGY FOR BIODIVERSITY CONSERVATION* (Columbia Univ. Press 2006); CORRIDOR ECOLOGY: THE SCIENCE AND PRACTICE OF LINKING LANDSCAPES FOR BIODIVERSITY CONSERVATION (Jodi A. Hilty, William Z. Lidicker Jr., & Adina M. Merenlender, eds., Island Press 2006). For a discussion of the most ambitious and potentially most successful use of migration corridors to combat the anti-biodiversity effects of climate change see Whitty *supra* note 5, at 88-89. In this important article, author Julia Whitty describes the process of "rewilding" through the use of continent-wide migration corridors. *Id.* The brain child of Earth First Founder Dave Foreman and Michael Soule, professor emeritus at the University of California-Santa Cruz, "[r]ewilding is bigger, broader, and bolder than humans have thought before." *Id.* For a discussion of an equally ambitious migratory mitigation measure, see Carl Zimmer, *A Radical Step to Preserve a Species: Assisted Migration*, N.Y. TIMES, Jan. 23, 2007, at F1. This article points out that "[s]tudies on the Bay checkerspot butterfly suggest that . . . climate change will push the insect to extinction. . . . One of the most radical strategies [conservation biologists] are considering is known as assisted migration. Biologists would pick a species up and move it hundreds of miles to a cooler place." *Id.* For at least one instance of assisted migration, see Douglas Fox, *When Worlds Collide*, CONSERVATION MAGAZINE, Jan.-Mar. 2007, available at <http://www.conbio.org/cip/article81whe.cfm>. This article claims that assisted migration, which could be considered a form of "eco-vigilantism," has already been documented with a charismatic form of yew tree called *Torreya taxifolia*. *Id.* With only a few hundred of its kind remaining in existence, a band of *Torreya* enthusiasts, self-named the "Torreya Guardians," is picking up surviving *Torreya* plants and moving them to cooler climates where, hopefully, this species can sit out the coming devastating effects of global warming. *Id.*

duced migrations will be extremely challenging for those remaining species that have failed to adapt and refuse to die.⁶³

D. Prophylactic Habitat

Conservation easements are ideally suited to mitigate the environmental consequences of climate change. For example, conservation easements are almost infinitely flexible and, depending upon the deal struck between the landowner and the easement holder, can protect biodiversity in numerous ways.⁶⁴ Thus, a conservation easement may be drafted to protect one or more target species or to protect entire ecosystems. Another advantage of conservation easements is that they can be imposed upon working landscapes. Although no exact figures are available, conservation easements have been used to protect numerous farms, ranches and even working forests from development.⁶⁵ Finally,

⁶³ Because this article focuses on the use of *terrestrial* conservation easements as a legal tool with which to combat the effects of global warming induced climate change, it omits discussion of *aquatic* and *oceanic* species that are as vulnerable to climate change as their terrestrial cousins. In other words, although beyond the scope of this article, the author urges the reader not to forget that aquatic and oceanic species are now in an "adapt, migrate or die" scenario. Like land species, aquatic and oceanic species will face many barriers to migration. Among such barriers will be changes in water temperatures, changes in salinity levels, changes in pH levels and, in the ocean, algae blooms and loss of life sustaining coral reefs through bleaching and altered currents. *See, e.g.,* HELVARG, *supra* note 2, at 301. "The Blue Frontier Campaign is dedicated to the protection, exploration, and restoration of America's living seas. . . . Today there is a desperate need to develop and expand not only our biological knowledge of the seas but also an active and educated political constituency to protect the ocean and its living resources." *Id. See, e.g.,* Elizabeth Kolbert, *The Darkening Sea: What Carbon Emissions are doing to the ocean*, THE NEW YORKER, Nov. 20, 2006, at 66. This article provides a detailed and disturbing overview of the destructive effects of carbon driven global warming and ocean acidification on ocean life, particularly coral reefs. *Id. See, e.g.,* COLIN WOODARD, OCEAN'S END: TRAVELS THROUGH ENDANGERED SEAS 3 (Basic Books 2000). Woodard argues that the world's oceans will suffer the same death and decay as the Black Sea unless humans change their understanding of the current marine crisis. *Id. See, e.g.,* FLANNERY, *supra* note 5, at 108-09. This work discusses damage to coral reefs from global warming. *Id. See generally* GORE, *supra* note 5, at 164-73. In this book, the author explains the adverse effects of global warming on ocean environments. *Id.* We can only hope that the same forces that militate to protect terrestrial life against the devastating effects of climate change will devote equal energies to saving aquatic and oceanic species.

⁶⁴ *See, e.g.,* Miral Alena Sigurani, *Protecting Property: Preserving Nature: The Benefits Of Conservation Easements*, 40 AZ ATTORNEY 34, 36 (2003) (noting that "[c]onservation easements are the only land preservation device allowing landowners to tailor their contract to meet specific needs, continue enjoyment of their land, permanently protect property and reap financial benefits").

⁶⁵ *See* Amanda Siek, *Smart Cities: A Detailed Look at Land Use Planning Techniques that are Aimed at Promoting Both Energy and Environmental Conservation*, 7 ALB. L.

because market forces drive conservation easement acquisitions, they are seldom subject to the oversight and approval of regulatory agencies or the winds of political change. Instead, conservation easements are typically either purchased from willing sellers at fair market value or donated to 501(c)(3) land trusts by landowners who then receive a tax deduction for their donation.

Remarkably, in view of the manifold uses to which conservation easements can be put to counter climate change, on the one hand, and in view of the devastating consequences that climate change poses for global biodiversity, on the other hand, there has been little scholarship or commentary devoted to consideration of how conservation easements might mitigate some of those consequences.⁶⁶ The paucity of direct discussion of the subject within the land trust community is all the more puzzling given the "tipping point" imminence of the full-scale effects of this human-caused phenomenon.

This is not to say that there has been no published scholarship or thought on the use of conservation easements to protect biodiversity. In his sophisticated and comprehensive treatise on the land conservation movement in America, Professor Brewer acknowledges the challenges to conservation efforts posed by global warming, but notes optimistically, "[f]ighting the anti-biodiversity effects of global climatic change is a contribution to worldwide conservation for which local land trusts are uniquely suited."⁶⁷ Regarding the use of conservation easements to preserve biodiversity in the face of global climate change, Professor Brewer notes that conservation biologists and organizations have

ENVTL. OUTLOOK 45, 62 (discussing how various zoning programs have used conservation easements "to protect the land from development and preserve it").

⁶⁶ A Westlaw search completed on July 17, 2006, combining the phrases "global warming" and "climate change" with the phrase "conservation easements" failed to call up a single law review or journal article frontally addressing the subject.

⁶⁷ RICHARD BREWER, CONSERVANCY: THE LAND TRUST MOVEMENT IN AMERICA 104 (University Press of New England 2003). *See also id.* at 100-14. In this section, Professor Brewer discusses how land trusts can be "conservation organizations," with the mission of preserving biodiversity. *Id.* Professor Brewer sets forth and explains in detail a series of nine "rules" for land acquisition. *Id.* The author of the present article highly recommends that his readers also peruse this section of Professor Brewer's work. For a contrary view, *see* FLANNERY, *supra* note 5, at 181. "[G]lobal warming could not have come at a worse time for biodiversity. In the past when abrupt shifts of climate occurred, trees birds, insects -- indeed entire biotas -- would migrate the length of the continents as they tracked conditions suitable for them. In the modern world, with its 6.3 billion humans, such movements are not possible." *Id.*

expended a great deal of time and effort “devising methods to figure out where biodiversity is and devising plans to capture it.”⁶⁸ One such biodiversity-preserving methodology is “gap-analysis.” Simply stated, scientists use “gap-analysis” to locate preserves where species or species-communities are absent or under-represented, i.e., where there are “gaps” in a particular species distribution.⁶⁹ Land trusts may then use this data in selecting and creating new preserves that contain the under-represented species or species communities and thereby fill the conceptual diversity-gaps identified by gap-analysis.⁷⁰ Nevertheless, Professor Brewer concludes that such “schemes, however useful they may be for today, suffer by assuming a static world.”⁷¹ Somewhat discouragingly, Professor Brewer further notes, “[m]uch more complicated approaches would be necessary to add global climatic change to methods designed to tell us what land to preserve. The task of protecting the amounts of land that such efforts might yield might well be impossible, as a practical matter.”⁷²

Rather than relying on gap-analysis, or “[m]uch more complicated approaches” that are impossible or impractical to implement, Professor Brewer suggests that the best use of conservation easements to protect biodiversity is for land trusts to acquire a “multiplicity of preserves.”⁷³ Professor Brewer offers several general justifications for this strategy. First, no single acquisition, even a large one, can capture all the species or the “interspecific [sic] interactions” of a target plant or animal. As Professor Brewer explains, “[a] stand or a preserve is a *sample* that catches some of the traits and not others, as a dipperful of water fails to catch everything living in a pond.”⁷⁴ Another reason for having a multiplicity of preserves of a particular biotic community is to lower the likelihood of regional extinctions. By

⁶⁸ BREWER, *supra* note 67, at 103.

⁶⁹ See The GAP Analysis Program, GAP, <http://gapanalysis.nbii.gov/> (last visited Jan. 25, 2008) (stating that GAP analysis identifies habitats of common species that are inadequately represented in existing conservation lands and gives land and policy managers information in order for them to make informed decisions regarding endangered species and their habitats).

⁷⁰ See BREWER, *supra* note 67, at 103 (detailing how gap analysis works in application).

⁷¹ *Id.* at 103 (footnote omitted).

⁷² *Id.* at 103-04.

⁷³ *Id.* at 102.

⁷⁴ *Id.* at 101 (emphasis added).

having a multiplicity of preserves, if a small population of a species goes extinct, that preserve may nevertheless be re-populated by members of that species harbored in a nearby, protected preserve.⁷⁵ Following this strategy, “[e]ach trust working in its own area can provide preserves in which it tries to capture the whole variety of local habitats available.”⁷⁶ As explained by Professor Brewer, “[w]hen species are eventually lost from its region, the land trust will have provided an array of habitats available for immigration by other native species that now find the climate to their liking.”⁷⁷

With regard to preserving biodiversity in the face of climate change, the “multiplicity of preserves” strategy may seem woefully wishful and perhaps belies Professor Brewer’s initial optimism. The underlying logic is simple: if one species is forced to migrate or is driven to extinction by climate change, perhaps a new species, following behind its fellow species in the pole-ward migration, will find the now vacant niche in the preserve suitable as either a permanent home or as a rest area on the long trek to survival. Undoubtedly, some readers would prefer a more proactive and science-driven strategy for preserving biodiversity in the face of climate change than Professor Brewer’s fallback approach of creating “prophylactic habitat.”⁷⁸

Notwithstanding, the above criticisms of Professor Brewer’s multiplicity of preserves approach, in view of the lack of published discussion on the role of conservation easements in combating the effects of global warming; Professor Brewer’s work is prescient and cutting-edge. While one can imagine any number of comprehensive, science-driven and collaborative efforts to utilize conservation easements to preserve biodiversity, one quickly finds the realities of such efforts to be daunting and likely impossible. These are some such realities: the earth is at the “tipping-point” on so many mega-trends, it is impossible for even our best scientists and best computer models to predict how various individual species, let alone complex ecosystems, will respond as

⁷⁵ *Id.* at 102. “[A]nother reason for having a multiplicity of preserves of a particular community: The likelihood of regional extinction of the species composing it is lowered.” *Id.*

⁷⁶ *Id.* at 104.

⁷⁷ *Id.* at 104.

⁷⁸ The phrase “prophylactic habitat” is not used by Professor Brewer in his writings and is original to this article.

temperatures rise, setting off a “domino effect” of dramatic atmospheric, oceanic and aquatic changes. Even if we lived under a government or international partnership that would fund the necessary scientific studies, the 1,500 or so local, state, and regional land trusts in America would necessarily have to form a flexible and effective system of collaboration to utilize complex scientific data in an effective and coordinated fashion. The speculation that such collaboration would resemble herding cats is reasonable. Moreover, the author acknowledges that at times the list of such “realities” appears endless.

One last barrier to more sophisticated and collaborative uses of conservation easements to preserve biodiversity deserves special attention. That barrier is the unavoidably opportunistic nature of many, if not most, land trust fee title or conservation easement acquisitions. Unlike governments, which can exercise powers of eminent domain to condemn and so acquire protection-worthy properties, land trusts must depend upon the largely random occurrence of fortuitous circumstances in which willing sellers or donors of protection-worthy properties present themselves at the same time the land trust either possesses or can acquire sufficient funding to purchase and/or provide stewardship for the properties thus acquired.⁷⁹ As was discussed earlier in this section, this is the unfortunate flip side of the freedom from governmental oversight and control afforded to land trusts by virtue of their use of market forces to acquire conservation assets. Consequently, when the many obstacles to a more scientific approach to targeting conservation-worthy land are balanced against the brief moment in time that remains for us to protect bio-diversity, Professor Brewer’s “multiplicity of preserves” approach is likely the only realistic way of dealing with the complex and problematic circumstances created by global climate change. Assuming that Professor Brewer’s approach is the most realistic, to be effective, it must nevertheless be implemented with consideration given to differing potential conservation easement scenarios. Such scenarios are discussed in the following sections.

⁷⁹ This is not to suggest, however, that no work is being done to develop more precise methods for targeting and acquiring conservation worthy lands and, in particular, those lands which afford the greatest protection for biodiversity. See, e.g., CRAIG R. GROVES, *DRAFTING A CONSERVATION BLUEPRINT: A PRACTITIONER'S GUIDE TO PLANNING FOR BIODIVERSITY* (Island Press 2003); SHEILA PECK, *PLANNING FOR BIODIVERSITY: ISSUES AND EXAMPLES* (Island Press 1998).

II. MULTIPLE EASEMENT TYPES

A. *Perpetual "Park" Easements*

In a previous article, I noted that in a world of unpredictably fluctuating temperatures, rising oceans, melting glaciers, mass extinctions and ecosystem migrations, our ability to draft conservation easements meeting these challenges must evolve as rapidly as possible.⁸⁰ I then proposed as a starting point two opposing models of conservation easements.⁸¹ The first model is the "park" model, which corresponds to the traditional perpetual easement.⁸² The second model is the "ark" easement, which corresponds to the non-traditional non-perpetual easement.⁸³ In this article, these two easement types are further discussed and a third new type of easement is considered, namely the easement that is created primarily for combating global warming.

In modern progressive park easements, we attempt to maintain environments that we have deemed to be "natural,"⁸⁴ i.e., to include a mix of species, which have co-evolved and are able to continue to interact indefinitely without aid of human intervention. Within these environments, we may also attempt to protect individual plant or animal species that we likewise believe to be "natural" and that we wish to save from extinction, usually resulting from the destruction of their natural habitat in other venues by humans. In attempting to maintain as "natural" or "habitable" an environment as possible in which to "implant" our species of interest, we may find ourselves attempting to "calibrate" as many aspects of the environment as possible. For example, in the park model, we may strive to maintain the precise intermixture of flora and fauna that we have determined

⁸⁰ Olmsted, *supra* note 1, at 43-44 (positing that rapid evolution in drafting practices is necessary to adequately draft conservation easements).

⁸¹ *See id.*, *supra* note 1, at 43-46 (distinguishing the two types of easements).

⁸² *See id.*, *supra* note 1, at 43-44 (defining the "park" conservation easement).

⁸³ *See id.*, *supra* note 1, at 44-46 (describing the "ark" conservation easement).

⁸⁴ The desire to maintain "natural" environments or ecosystems may arise from a variety of value systems. Hence, the scientist may want to preserve natural environments for the sake of scientific study. Pharmaceutical companies may want to preserve natural environments because such environments provide them with chemicals which can be developed into medicines and marketed at great profit. Individuals may want to preserve natural environments for aesthetic reasons or because humans, in a Thoreauvian sense, naturally gravitate to and value natural systems.

represents a “natural” or “indigenous” ecosystem for the species we are protecting. Accordingly, we monitor and manipulate park ecosystems to maximize constancy, even against an external background of rapid and potentially harmful change. Most of the 18,000 conservation easements in the United States held today by private land trusts follow the park model.⁸⁵

If they are conceived of as preserves for a particular species, or group of species, park easements are extremely vulnerable to the pending effects of global climate change.⁸⁶ While individual park easements vary greatly, they all share a critical constant: a fixed geographic location. Because of the park model’s fixed location, climate change may render any particular park easement inhospitable to a particular species or set of species. Such species may find themselves forced to either migrate or die. In a worst-case scenario, where the members of the species in that easement represent the last such population on the planet, a failure to migrate would result in extinction. As noted earlier in this article, being the most highly industrialized society on the planet, we have added an immense number of human-made barriers to migration to the already challenging natural barriers such as oceans, rivers, mountains and the like. While we have attempted to create migration corridors and other means for mobile species to travel from one habitat to the next, such measures are insignificant when compared to the human-made barriers we have

⁸⁵ The mainstream’s bias in favor of perpetual conservation easements is illustrated by this excerpt from the Land Trust Alliance Strategic Plan 2004-2008, Executive Summary:

When landowners donate land or an easement to a land trust, *they expect the land trust to protect their land for all time*. And when a land trust accepts that gift, *it makes a promise in perpetuity with the landowner*, to its donors and to the surrounding community. The best way to keep this promise is to build strong and enduring institutions that are managed in accordance with [Land Trust] *Standards and Practices*. . . . To perpetuate our conservation mission for generations to come, land trusts will need to build strong memberships and public support that will come to the defense of protected land whenever it is threatened.

LAND TRUST ALLIANCE STRATEGIC PLAN 2004-2008, EXECUTIVE SUMMARY, http://www.lta.org/aboutlta/strategic_plan_summary.doc (first and second emphasis added).

⁸⁶ The vulnerability of traditional “static” conservation easements is gradually being recognized. As noted by one law review author, “[t]he static, ‘equilibrium’ view of nature as unchanging is yielding to a dynamic model based on the conclusion that ‘natural systems change incessantly.’ Yet, conservation easements traditionally have been drafted as unchanging legal agreements between landowners and easement holders, reflecting the obsolete model of nature as ‘static and unchanging.’” Duncan M. Greene, Comment, *Dynamic Conservation Easements: Facing the Problem of Perpetuity in Land Conservation*, 28 SEATTLE U. L. REV. 883, 884 (2005).

erected. Accordingly, many species may find themselves trapped in preserves which are little more than islands in the midst of inhospitable locations filled with rapidly moving automobiles, suburban sprawl, open and exposed fields, massive clear-cuts, fenced areas, and hundreds of thousands of acres of otherwise denuded and barren land. If park easements are static preserves, then climate change may result in the ultimate irony of turning them into death traps for those species they were intended to protect.

The loss of a particular species, group of species, or ecosystem targeted for protection by a given conservation easement will inevitably raise legal questions as to whether the easement should be terminated, perhaps under the standard provided in the Treasury Regulations for tax deductible easements—i.e., that the easement's purpose has become "impossible or impractical."⁸⁷ The responses generated by such inquiry will turn on the provisions of the easement and the specific facts surrounding the loss of the species or group of species of interest. However, there may be economic and other practical reasons for not terminating a park easement. Because park easements are intended to be perpetual, they require a judicial proceeding for termination, which may incur considerable legal expenses. Terminating a park easement may also have intangible, but equally serious, costs in terms of negative public relations if it is perceived that the land trust is operating at a net loss in terms of easement acquisition and retention. Thus, for both economic and institutional reasons, a land trust should be hesitant to terminate a park easement.

Most importantly, in biodiversity terms, the answer should be *not* to terminate, but rather to maintain the easement as a perpetual park easement.⁸⁸ The easement holder should always consider the possibility that terminating one easement without having a plan to replace it with another will have a "musical chairs" effect. By reducing the net total of conservation easements, there will be fewer habitats for displaced and questing individuals or species groups to "land." Thus, following Professor Brewer's log-

⁸⁷ Treas. Reg. § 1.170A-14(g)(6)(i) (2008). This provision further stipulates that a tax-deductible easement can be extinguishable only through a judicial proceeding, and only if subsequent unexpected changes in the conditions of the easement make its continued use "impossible or impractical."

⁸⁸ See BREWER, *supra* note 67 (arguing the advantages of maintaining perpetual ark easements).

ic, with which this author concurs, even if a protection-worthy species has departed (whether due to migration, death or extinction), in the long, hard, planet-wide and pole-ward march of Earth's species, there will exist the strong possibility that the abandoned ecological niche will soon be filled by new residents, whether permanently or temporarily. Consequently, the conservation easement should not be valued only as a static preserve for a particular species, but also as a "prophylactic habitat" that may support other, new species in their struggle for survival. The conservation community will accomplish more by adopting a "prophylactic habitat" approach rather than retaining a "musical chairs" approach, which would terminate conservation easements lacking the desired species mixes without replacing such terminated easements.

If the parties to a park easement truly understand and believe the global warming scenarios that the world's scientific community is so desperately attempting to warn us of, the parties should make a drafting decision for every new easement regarding whether they intend that the easement benefit only a specified species, group of species, or ecosystem. In the alternative, they should decide whether they instead intend that the easement remain in existence in perpetuity and for the benefit of any newly "immigrated" species that may have found safe harbor on the eased land, regardless of the duration. If land trusts or other easement holders believe that the "prophylactic habitat" approach is the best strategy for species preservation, such entities could negotiate for provisions creating a perpetual park easement during the easement acquisition process. Because perpetual conservation easements have been and currently are the norm, it would not be exceedingly difficult to craft such provisions and include them in the conservation easement deed.

Of course, the enormity and complexity of the future global changes to the natural environment and its inhabitants may make such simple, black and white decisions impossible. Thus, there are likely to be many important intermediate positions that land trusts will be forced to consider. For example, for a given conservation easement, a land trust may elect to vigorously resist invasive species from threatening the intended species receiving protection by the easement. However, the time may come when the land trust decides to allow invasive, but otherwise benign,

species to colonize the easement. As earlier mentioned, there may be occasions when the valued species have either fled or been extirpated, forcing the land trust to make the ultimate decision regarding whether to maintain the easement in its conservation inventory. By anticipating such intermediate positions and drafting conservation easements accordingly, land trusts on one hand may be able to minimize the legal and institutional costs which may be incurred in either terminating a conservation easement or, on the other hand, resisting a legal challenge by the owner of the underlying land to terminate the easement.

B. Non-Perpetual "Ark" Easements

In stark contrast to the "park" model is the "ark" model. If an easement fails in its ecological mission, and if the determination is made that the easement would serve no ecological benefit as a "prophylactic habitat," as described above, the easement should, if its terms permit, be converted to an "ark" easement. Like the biblical ark, non-perpetual ark easements are designed to provide species with a safe haven on their journeys to hopefully more beneficial habitats. They are designed to assist species until environmental conditions improve. Ark easements also serve a related function, namely to provide corridors through which species can safely migrate from newly uninhabitable lands to more welcoming climes. Thus, an ark conservation easement is one that could be more easily terminated than a park model conservation easement could be terminated, should its purpose fail because of changing environmental conditions.⁸⁹ In terms of

⁸⁹ See Greene, *supra* note 86 at 923. While Duncan M. Greene's distinction between "static" and "dynamic" conservation easements reflects the same underlying concerns as the "park" versus "ark" distinction made in this article, Greene generally argues that the key to creating truly perpetual conservation easements lies in drafting conservation easements to contain sufficiently dynamic, flexible, and adaptive provisions. *Id.* See also Olmsted, *supra* note 1 at 45-46. The author of this article agrees that conservation easements need to be more dynamic, flexible and adaptive. *Id.* However, the focus of this article is on what should happen when adaptation is no longer possible or practicable, and the easement should be terminated and re-deployed elsewhere to maximize its social benefit. To the extent that dynamic, flexible and adaptive provisions allow for, or make easier such re-deployment, the ideas in this article harmonize with those espoused by Greene. Another of Greene's conclusions with which this author agrees is that "[l]and trusts that use perpetual conservation easements face a fundamental paradox of land conservation: how to truly preserve land in perpetuity in the face of perpetual change." Greene at 901. *But see generally* MICHAEL M. GUNTER, JR., BUILDING THE NEXT ARK: HOW NGOS WORK

drafting, an ark model conservation easement would be drafted so that it can be terminated⁹⁰ at the discretion of the holder and without the judicial oversight that normally would be required for the termination of a perpetual conservation easement.⁹¹ Furthermore, as discussed more fully in the following sections, an ark easement must be drafted so that upon its termination the holder is entitled to the full-appreciated value of the newly released development rights. Should the easement holder fail to draft provisions entitling it to the full-appreciated value of the development rights, the resulting shortage of funds realized from the terminated easement will likely be insufficient to purchase a new replacement conservation easement or fee title land.

Ideally, the grantor and grantee would determine whether any given easement should be a park easement or an ark easement at the inception of the easement. This determination will depend upon two different sets of constraints. The first set of constraints is financial. If the grantor intends to donate either the conservation easement or the funds to purchase the easement, and this is done for purposes of a tax deduction under IRC 170(h), and perhaps under state tax laws as well, then the conservation easement must be perpetual and cannot be used as an ark easement. The second set of constraints is much broader and runs the ga-

TO PROTECT BIODIVERSITY (University Press of New England 2004), for an entirely different approach to the "ark" concept of species and biodiversity preservation. *Id.*

⁹⁰ This is not to say that termination would be the only solution for an ark conservation easement whose original purposes could no longer be achieved. In some cases, the remedy might be to amend the easement to permit its use for other conservation purposes.

⁹¹ See generally Olmsted, *supra* note 1 (urging the reader to review the following text and references, which remain relevant to the above discussions in the present article); see also Nancy A. McLaughlin, *Amending Perpetual Conservation Easements: A Case Study of the Myrtle Grove Controversy*, 40 U. RICH. L. REV. 1031, 1090 (2006) (noting that "parties generally are free to negotiate for the sale or conveyance of *nonperpetual* conservation easements (i.e., conservation easements that expressly grant the holder the discretion to agree with the owner of the encumbered land to modify or terminate the easement as the holder sees fit)" and discussing the case of *perpetual* easements, where it is likely that termination will be governed by state law governing charitable trusts) (emphasis added); Nancy A. McLaughlin, *Rethinking the Perpetual Nature of Conservation Easements*, 29 HARV. ENVTL. L. REV. 421, 426 (2005) (making a thorough and thoughtful analysis of the application of charitable trust principles to the termination and substantial amendment of conservation easements); 26 U.S.C. § 170(h) (2008) (requiring that a tax-deductible easement be "granted in perpetuity"); Treas. Reg. § 1.170A-14 (g)(6)(i) (2008) (mandating that a tax-deductible easement be extinguishable only in the context of a judicial proceeding, and only if a subsequent unexpected change in conditions makes "impossible or impractical" the continued use of the encumbered property for conservation purposes).

mut from requirements imposed by a third party funder that the easement be perpetual to public relations concerns that the land trust is abdicating its ostensible mission of preservation in perpetuity. If both sets of constraints can be overcome, then the land trust is free to determine how an ark easement might better serve the land trust's conservation mission compared to a park easement.

At first blush, the analysis is quite simple. Any provision that increases the land trust's control over its inventory of conservation properties is good. Following this logic, any ark easement will better serve the land trust's conservation mission than any park easement. This is especially true as the land trust community encounters the ecological uncertainties resulting from global warming. However, this conclusion is based on several key assumptions, which may not apply to any given land trust. First, the conclusion that an ark easement will always be superior to a park easement assumes that the land trust's ability to terminate the easement cheaply and easily will not create a perverse incentive for the land trust to "cash out" of conservation easements in which the development rights have substantially appreciated. Fortunately, this outcome can be prevented by careful easement drafting which specifies that the proceeds from the termination of any conservation easement be used for conservation purposes similar to those of the now terminated easement. The second assumption is that for every ark easement that is terminated, there will be an equal and offsetting conservation use for the funds received by the easement holder. For example, the use of ark easements should not result in a net loss of conservation easements that would undermine or defeat the "multiplicity of preserves" approach advanced by Professor Brewer and advocated earlier by this author.

As suggested above, the successful use of ark easements depends upon the ability of the land trust to acquire conservation easements, or other mitigation measures, that are ecologically superior to the terminated ark easement. Moreover, this objective must be something that is possible to accomplish over time and in a programmatic fashion. This may not be as difficult in practice as it might first seem. If replacement easements are required to be of roughly the same size and similar in other characteristics to the terminated easement, then the model does not

work. If however, the proceeds from the terminated ark easement can be re-deployed in an opportunistic fashion, then the model likely would work.⁹² For example, the proceeds from the termination of a single large easement could be used to acquire several smaller easements, or vice versa. It is even conceivable that a land trust could hold the proceeds from several terminated ark easements in reserve to be pooled with the resources of other land trusts in order to acquire a single, large conservation easement encompassing one or more intact ecosystems which protect sustainable populations of endangered species. In this fashion, the terminated easements would have served as placeholders for the acquisition of conservation easements resulting in a net increase in conservation value. Presumably, the consolidation of several smaller conservation easements into a single larger conservation easement that results in a net increase in protected acreage, or in the numbers of endangered species protected, is not in conflict with Professor Brewer's "multiplicity of preserves" approach; although, the author acknowledges the connotation of a multiplicity of "separate" preserves in Professor Brewer's approach.

Having advanced arguments in favor of utilizing both park and ark easements, this author does not advocate the exclusive use of one or the other, even if such singularity of purpose were possible. Instead, until land trusts have developed track records based upon the use of each type of easement, the author suggests that, wherever possible, land trusts experiment with both types of easements, subject of course to the varieties of constraints for each type as discussed in this article. Regardless of the choices made for individual conservation easements, the author recommends that the overriding principle is the acquisition and crea-

⁹² The reader is cautioned not to confuse the "musical chairs" approach to conservation easement termination discussed in a previous section with the "re-deployment" approach to conservation easement termination represented by "ark" easements. In the game of musical chairs, one chair is removed with each cycle and is not replaced. Like the game of musical chairs, using the "musical chairs" approach to conservation easements, once a conservation easement is terminated, it is not replaced with a new easement. Instead, the value attributable to the former easement is expended on other conservation projects, for example species monitoring or habitat restoration. Accordingly, the "musical chairs" approach results in a net loss of eased land. The "re-deployment" approach is the precise opposite of the "musical chairs" approach. Rather than taking a conservation easement permanently out of play, the re-deployment strategy seeks to replace the terminated conservation easement with another easement of similar or better conservation values as quickly as possible. Thus, there is no net loss of eased land.

tion of a “multiplicity of preserves,” as argued for by Professor Brewer, rather than which type of easement to use.

C. Carbon Sequestering Easements

The park and ark easements discussed above both address how conservation easements might be constructed and drafted to respond to the harmful ecological consequences of global warming. In addition to considering how conservation easements might mitigate the “on-the-ground” consequences of global warming, it is important also to consider how conservation easements can be drafted to directly, or indirectly, mitigate or help prevent global warming in the first instance.

A fundamental assumption of this article is that human-caused mega-trends are causing or will cause massive global-scale changes that will in one way or another force all living creatures to “adapt, migrate or die.” A further assumption is that the most dangerous, cataclysmic, and advanced of these mega-trends is global warming. Although it has taken a surprising amount of time for scientific consensus to develop around the concept of global warming, and while there has likewise been an improvident delay in the layman’s understanding of global warming, the crisis is now apparent. Thus, while the totality of causes of global warming are complex, interactive, and involve feedback loops that can be both intricate and immense, it is possible to identify one primary source—human-caused disruption of the carbon cycle resulting in the release of carbon dioxide into the atmosphere, where it traps heat from the sun, creating a greenhouse effect.⁹³

One of the most exciting innovations in the battle to combat global warming has been the development of “carbon markets.” Some carbon markets are the creation of governmental regulation and are thus mandatory. The most common of such emerg-

⁹³ See, e.g., Ari Bessendorf, *Games in the Hothouse: Theoretical Dimensions in Climate Change*, 28 SUFFOLK TRANSNAT'L L. REV. 325 (2005). Bessendorf provides a high-level, but easily accessible explanation of the relationship between human disruption of the carbon cycle and global warming and political and legal responses to this planetary crisis. *Id.* See Tim Appenzeller, *The Case of the Missing Carbon*, NAT'L GEOGRAPHIC, Feb. 2004, at 88. Appenzeller provides another easily accessible discussion of the carbon cycle and how it is affected by human activity. *Id.* While there are many other human-induced greenhouse gases, carbon dioxide is so prominent in global warming that the effects of other greenhouse gases are measured in terms of their equivalencies to the effects of carbon dioxide.

ing regulated markets today are built around “cap and trade” programs.⁹⁴ Stated simply, in a cap and trade program, a cap or absolute limit is placed on specific greenhouse gas emissions, most notably carbon. Such caps may be based on the historical emissions of a particular industry, a particular region, and in some instances, individual carbon “emitters.” Once the cap is established, permissible emissions that total the cap are distributed among the stakeholders. Those stakeholders that are able to reduce their emissions below their allocation may sell or trade their excess emission allowances to other stakeholders that are unable to reduce their emissions below their allowances. Because the sale of such “carbon credits” can result in substantial profits, carbon markets can create powerful economic incentives for reducing carbon emissions and/or “sequestering” previously emitted carbon.⁹⁵

In addition to such mandatory market-driven restrictions on emissions, like the cap and trade programs, purely voluntary markets have grown up as well. In one form of such voluntary markets, carbon emitters purchase “carbon offsets” which “counteract” the stakeholder’s emissions. Such offsets may be in the same industry as that of an emitter purchasing them, but this is not a necessary condition for all offset programs. In some offset programs the emitter of one form of greenhouse gas may purchase offsets created by the reduction in emissions of another greenhouse gas. Voluntary carbon trading programs are so effective that at least one carbon market has formed around the concept, namely the Chicago Climate Exchange, which describes itself as “the world’s first and North America’s only active voluntary, legally binding integrated trading system to reduce emissions of all six major greenhouse gases (GHGs), with offset projects worldwide.”⁹⁶

One of the most popular forms of carbon “credit” arises from

⁹⁴ See Berlin, *supra* note 36, at 87 (discussing types of cap and trade programs implemented by the European Union).

⁹⁵ See, e.g., SWEET, *supra* note 2, at 202-08 (comparing the general advantages and disadvantages of carbon “cap and trade” systems with broader reaching carbon tax systems).

⁹⁶ Chicago Climate Exchange, <http://www.chicagoclimatex.com>. See also *Forest Carbon Credits: New Funds for Conservation*, PACIFIC FOREST TRUST, <http://www.pacificforest.org/services/forever.html> (asserting that carbon credits have the potential to “[p]rotect [f]orests and [o]ffset [c]arbon [d]ioxide [e]missions [v]erifiably and [c]ost-[e]ffectively ... [w]hile [a]chieving [m]ultiple [e]nvironmental [b]enefits”).

the ability of forests to “sequester” carbon. Although, it is beyond the scope of this article to explain this phenomenon in technical terms, stated simply, carbon sequestration can occur when plants take in carbon dioxide and store the carbon in their cells. Thus, forests, such as the rainforests of South America, or the remaining vast tracts of forested land in the west coast states of California, Oregon and Washington, are major carbon “sinks” which can be used to create carbon credits under a mandatory cap and trade system or carbon offsets under a voluntary program.

As one might intuit, a prerequisite for any forest based carbon credit or carbon offset program is a conservation easement that preserves the forest so that it can continue to harbor the carbon already sequestered and to sequester more carbon as time passes. Although specialized terminology for describing the workings of carbon offset programs based on forest-land programs is still evolving, a number of terms and concepts have emerged. For example, if the conservation easement prevented a functioning and healthy forest from being cut down, then “avoided deforestation” has occurred. If the forest would have been cut down “but for” the contribution of a voluntary offset program or other carbon-trading program, then the avoided deforestation is said to have “additionality.” “Additionally,” which can be expressed in many ways (e.g., tons of carbon dioxide sequestered), underpins credits traded in a carbon market. One type of such credits is “verified emission reductions” or “VERS.”

As one would imagine, certain protocols and standards must be met before carbon credits are awarded to a particular carbon sink, such as a forest under a conservation easement that protects the forest’s carbon sequestration properties.⁹⁷ Currently, California is one of the leading players in this field by virtue of having developed protocols by which carbon credits can be calculated.⁹⁸ If protocols, such as those developed in California, are adopted by major national and international carbon trading markets, holders of newly minted conservation easements encumbering qualifying forest lands that would have been defo-

⁹⁷ *Carbon Banking for Climate Benefits*, FORESTLIFE, Winter 2006, at 3 (stating that a 2,200-acre forest on which the Pacific Forest Trust holds a working forest conservation easement will permanently capture more than 500,000 tons of carbon dioxide over a 100-year period).

⁹⁸ California Climate Action Registry, Forest Protocols, <http://www.climateregistry.org/PROTOCOLS/FP/> (detailing California’s program for calculating carbon credits).

rested but for the conservation easement may be able to tap into these markets to achieve additional sources of funding for conservation easement acquisition and stewardship.

D. "Co-Benefits" and the Interaction of Easement Values

Both park and ark easements can interact with carbon sequestration projects or programs in several important ways. As well as the carbon sequestration based "credits" that could be created by a forest easement, an additional form of "credit" or "added value" can be created based on the functioning ecosystems which would not have survived but for the avoided deforestation resulting from the conservation easement. These credits are typically referred to as "co-benefits." Co-benefits are defined within a conservation easement or other agreement between parties engaged in a conservation transaction. They include such ecological and social benefits as maintenance of habitat and migration corridors for particular species (including threatened, rare, and endangered species), water quality enhancement, preservation of open spaces, availability of recreational uses and the like. Who owns and controls the co-benefits will always be the result of the unique aspects of any given conservation easement negotiation. For example, an easement grantor and grantee may agree in a conservation easement to protect a particular forested area from timber harvesting and ultimately development into a subdivision. If but for the imposition of the conservation easement the forest would have been destroyed, additionally for avoided deforestation is achieved. Depending upon how the conservation easement is drafted, the grantor, the grantee or possibly a third party "carbon aggregator" may be able to market both the verified emission reductions resulting from additionally and also various co-benefits, such as habitat preservation and migration corridors. Even if not marketed separately from carbon sequestration credits, such co-benefits may add to the dollar value of the carbon credits achieved by the party vested with the right to market carbon sequestration credits. While it is impossible within the scope of this brief article to explore all the possible permutations of parties and rights within a given conservation transaction, it is important to keep in mind that anti-global warming measures incorporated in conservation transactions can

create valuable rights.

III. CAPTURING APPRECIATED VALUE UPON TERMINATION

A. *The Fiction of Perpetuity and the Reality of Greed*

Both perpetual park and non-perpetual ark easements must contain provisions that allow the holder to recoup the full value of the easement upon its termination so that such value can be re-deployed for similar conservation purposes in some other location. As explained above, an ark model conservation easement is drafted to be terminable at the discretion of the holder.⁹⁹ Park easements, on the other hand, are drafted to exist in perpetuity. This difference might suggest that strategies for the recovery of the full value of a terminated conservation easement might be more applicable to ark easements than park easements. However, this is not the case. While land trusts typically draft conservation easements to exist "in perpetuity," doing so creates a fiction of ecological stability that is far removed from the reality of global warming among many other dynamics of our environment.¹⁰⁰ As the effects of global warming and global climate

⁹⁹ See McLaughlin's *Rethinking*, *supra* note 91, at 449 ("If the donee of a conservation easement wishes to be free to terminate the easement or modify its charitable purpose . . . it should negotiate for the inclusion of a provision to that effect in the deed of conveyance. . . .")

¹⁰⁰ See generally Olmsted, *supra* note 1. Regarding the perpetuity aspect of conservation easements, the major issues can be divided into the following two overlapping categories: (1) *should* conservation easements exist in perpetuity and (2) *can* conservation easements exist in perpetuity. *Id.* To say that these questions have created a firestorm of controversy, both in academia and in the trenches of the conservation easement movement, would not be an overstatement. Compare *id.* with Julia D. Mahoney, *Perpetual Restrictions on Land and the Problem of the Future*, 88 VA. L. REV. 739 (2002). Professor Mahoney's article, which is the most influential academic article arguing *against* perpetual conservation easements, has produced many thoughtful and detailed responses. Perhaps the most prominent and constructive responses are the following: McLaughlin's *Rethinking*, *supra* note 91, McLaughlin's *Amending*, *supra* note 91, and JEFF PIDOT, *REINVENTING CONSERVATION EASEMENTS: A CRITICAL EXAMINATION AND IDEAS FOR REFORM* (Lincoln Institute of Land Policy 2005). See also, Barton H. Thompson, Jr., *The Trouble with Time: Influencing the Conservation Choices of Future Generations*, 44 NAT. RESOURCES J. 601, 607-08 (2004). In his article, Thompson, Jr. generally rebuts Professor Mahoney's views on perpetuity, but also notes that Professor Mahoney recognizes "the notion of 'perpetual' land conservation is a bit of a canard." *Id.* As noted above, the debate has not been limited to academia; for example, the widely distributed publication *Range* magazine devoted nearly its entire Winter 2004 issue to the subject of perpetuity in con-

change increase, resulting in ever more abrupt, complex and unpredictable relationships and feedback loops between and among the full panoply of geographical features, landscapes, habitats and species themselves, what we can expect is a cumulative disruption of micro and macro ecosystems on a global scale. Moreover, a conservation easement drafted to last in perpetuity, or any substantial length of time for that matter, guarantees that there will be a succession of underlying landowners. The rules of probability assure us that eventually one of the serial landowners will be greedy enough to attempt to terminate the conservation easement and capture some of the appreciated value represented by the restored development rights.¹⁰¹ Accordingly, we can be assured that very few, if any, "perpetual" conservation easements will actually last for perpetuity, and most, if not all such easements will eventually terminate, or at least require amendment.¹⁰² Nevertheless, while the conservation easement is in ex-

servation easements. *See, e.g.*, Tim Findley, *Forever and Ever, Amen: Land Trusts and the Frightening Thought of Perpetuity*, RANGE, Winter 2004, at 42.

¹⁰¹ *See generally* Olmsted, *supra* note 1. This author pointed out the following: the notion that such a cynical forecast is not merely a creature of the author's imagination is chillingly corroborated in the following even gloomier, but undoubtedly accurate, prediction by Professor Brewer:

The next few decades will bring rising land prices, sales of many eased properties, and many more court tests of conservation easements. It wouldn't be surprising if half of the 11,700 properties on which local land trusts hold easements were to be sold in the next ten years. Some of the new owners will be environmentalists, just as interested in protecting the property's conservation values as the original owners. Of the others, some will be ignorant of easements, some disdainful, and some hostile. Some will buy easement-protected land in the full expectation of breaking the easement so that they can do what they want with the land. Properties in the path of development that are worth a couple of hundred thousand dollars as restricted but millions without the easement will attract such speculators.

BREWER, *supra* note 68, at 171.

¹⁰² *But see generally* JANET DIEHL & THOMAS S. BARRETT, *THE CONSERVATION EASEMENT HANDBOOK* (Land Trust Alliance 1988); ELIZABETH BYERS & KARIN MARCHETTI PONTE, *THE CONSERVATION EASEMENT HANDBOOK* (2nd ed. 2005); LAND TRUST ALLIANCE, *STANDARDS AND PRACTICES* (1997). In fairness to the land trust community, land trusts have long recognized the need to build flexibility into their conservation easements to enable the holders to respond to changed conditions. *See generally* DIEHL & BARRETT; BYERS & MARCHETTI PONTE, *LAND TRUST ALLIANCE*. For example, both editions of the Conservation Easement Handbooks as well as the Land Trust Alliance's Standards and Practices recommend amendment and discretionary approval provisions in conservation easements. *See generally* DIEHL & BARRETT; BYERS & MARCHETTI PONTE, *LAND TRUST ALLIANCE*.

See generally Mahoney, *supra* note 100. Furthermore, most conservation easements expressly address the issue of termination (i.e., termination must occur in the context of a judicial proceeding and then only if continued protection of the land for the specified conservation purposes becomes impossible or impractical as required by the Treasury Regu-

istence, it is the nature of the development rights held in eyance by the easement to appreciate significantly as a result of various background economic forces that occur merely as a sequence of the passage time.¹⁰³

Accordingly, through either established law or careful legal drafting, it should be possible for the holder of either park or ark easements to recover (on behalf of the public) the full-appreciated value of the easement upon its termination, the value of which could then be used to purchase a new and viable conservation easement possessing as many of the conservation values of the terminated conservation easement as possible (or to purchase fee title to land, facilitate species reintroduction, or otherwise promote similar conservation goals to those of the terminated conservation easement). The value attributable to the terminated easement ideally would be used to promote similar conservation goals in the same jurisdiction or region as the original easement, although this may not always be possible (or desirable, for example, if the species the terminated conservation easement was designed to protect was extirpated from the area with no hope of recovery but could be assisted in another location).¹⁰⁴

lations). *Id.* In other words, contrary to the representations of some, notably Professor Mahoney, the land trust community has not been oblivious to the issues raised by changed circumstances as they relate to conservation easement perpetuity and termination. *Id.*

¹⁰³ Although discussion of the following issue is beyond the scope of this article, the author finds it difficult to conceptualize economic appreciation without also speculating as to the concurrent existence of what might fairly be called "conservation appreciation." For example, just as the increasing scarcity of developable lands will tend to result in increasing values of the remaining reserves of such land, so might the increasing scarcity of "protection-worthy" lands drive up the value of remaining land reserves. In this example, one might think of "protection-worthy" lands as a subset of developable lands, i.e., the very lands that land trusts seek most to protect. Perhaps these different forms of appreciation could even combine to result in greater than expected asking prices for new conservation easements. Thus, the appreciation of a terminated conservation easement could be based primarily upon the increased value of the now released development rights. However, the cost of an equivalent replacement conservation easement might exceed even the appreciated value of the terminated conservation easement and released development rights because the value of the replacement easement is based on the combination of the normal economic appreciation of land and development rights and, additionally, on so-called "conservation appreciation." The result of such a value differential would likely be to price the prospective holder out of the market. Whether such a quantum leap in conservation easement valuation standards would ever evolve or whether such "conservation equity" would ever be recognized as a marketable value is left to the prescience of the reader.

¹⁰⁴ See McLaughlin's *Rethinking*, *supra* note 91, at 484, 490-98 (proposing a substitute for the current easement system).

B. A Paucity of Legal Authority

As explained in *Capturing the Value of Appreciated Development Rights on Conservation Easement Termination*, a logical first step in exploring the legal means of recovering the appreciated value of development rights upon conservation easement termination is to explore different models of divided real property ownership for examples of how accumulated appreciation is allocated among the multiple stake holders of the property in question.¹⁰⁵ Exploring these models, we can begin to develop legal arguments that support the easement holder's right to recover the full-appreciated value of development rights released upon easement termination. Such arguments will undoubtedly be called into play as later generations of profit-motivated landowners begin seeking legal arguments with which to plunder the reserves of appreciated capital in conservation easements.¹⁰⁶

In developing such arguments, one must first characterize the legal nature of conservation easements. To this end, conservation easements are partial interests in land conveyed to charitable organizations and governmental units to be held for the benefit of the public. As such, they are assets that belong to the public, and the public should be entitled to the full-appreciated value of such assets.¹⁰⁷ Professor McLaughlin notes that a perpetual conservation easement "suppresses the development and use value of the encumbered land, and that value lies dormant and inaccessible[]" until the easement is terminated.¹⁰⁸ She argues that upon the termination of a perpetual conservation easement, the full-appreciated value of the development and use rights restricted by the easement should be paid to the holder of the easement, on behalf of the public, to be used for similar conservation purposes. The value should equal the difference (measured at the time of extinguishment) between: (1) the fair market value of the land free of the easement restrictions (i.e. the "after" value), and (2) the fair market value of the land subject to the

¹⁰⁵ See generally OLMSTED, *supra* note 1 (exploring the difficulty of maximizing the value of land covered by terminated conservation easements).

¹⁰⁶ See *id.* (exploring legal arguments surrounding conservation easements).

¹⁰⁷ See Uniform Conservation Easement Act § 1(1) (2007) ("Conservation Easement" means a nonpossessory interest of a holder in real property. . . .") (emphasis added), available at http://www.law.upenn.edu/bll/archives/ulc/ucea/2007_final.htm.

¹⁰⁸ McLaughlin's *Rethinking*, *supra* note 91, at 491.

easement restrictions (i.e., the “before” value), assuming the restrictions will not be extinguished and the easement will continue to be enforced in perpetuity (described in *Rethinking* as the “after and before” appraisal method).¹⁰⁹

Support for this approach is found in *Hartford National Bank and Trust Company v. Redevelopment Agency of the City of Bristol*.¹¹⁰ That case involved a charitable trust that held “in gross” certain covenants restricting the development and use of land in perpetuity. Upon condemnation of the land and subsequent extinguishment of the restrictive covenants, the Supreme Court of Connecticut held that the correct way to determine the value of the “in gross” interest held by the trust (for purposes of compensating the trust for the taking) was by subtracting the value of the land subject to the restrictive covenants from the value of the land free of such restrictions. Also as discussed in *Rethinking*, there is at least one common law model, namely tenancies-in-common, in which the appreciation in land with multiple owners is apportioned to the various owners upon the termination of the multiple ownership form. Specifically, in a suit to partition property owned by tenants-in-common, a court will divide the property or the proceeds from the sale of the property according to the cotenants’ respective proportional interests in the property.¹¹¹

As is readily apparent, there is scant legal authority to address the recovery of the appreciated value of retired conservation easements. There may yet be other models in commerce and law which I leave to my readers to discover and bring to light. In the interim, because there is no authority directly on point regarding this issue, a presumably safe route for the conservation easement holder is to insure that the easement is drafted expressly to provide the holder with the full value of the easement upon termination.¹¹² Accordingly, the following sections describe how both traditional perpetual (park) conservation easements and non-

¹⁰⁹ See *id.* at 491-99 (setting forth policy arguments in favor of this approach).

¹¹⁰ *Hartford Nat'l Bank & Trust Co. v. Redevelopment Agency of the City of Bristol*, 321 A.2d 469 (Conn. 1973).

¹¹¹ See McLaughlin's *Rethinking*, *supra* note 91 at 426 n.15 (articulating policy reasons for using the *Hartford* case and a tenancy in common model for allocating to a conservation easement holder the appreciated value of development rights).

¹¹² See BYERS AND MARCHETTI PONTE, *supra* note 102, at 462-65 (providing sample easement provisions for allocating appreciated value of conservation easements to former holders).

perpetual (ark) model conservation easements should be drafted to ensure that the holder recovers the full-appreciated value of the easement upon its termination to be used to accomplish similar conservation purposes in some other manner or location.

C. *To Extinguish or Not to Extinguish*

In drafting the valuation upon termination provisions of both park and ark easements, it is critical to keep in mind the precise manner in which the use of the development rights were taken from the hands of the landowner grantor upon execution and recording of the particular conservation easement in question. This is because the manner in which the development rights were initially neutralized may bear consequences for what happens to these rights upon termination of the conservation easement. For example, one may logically assume that the primary economic effect of the termination of a conservation easement is the “release” of the development rights, or, stated differently, the “reunification of the development rights with the underlying fee ownership.” However, such an idea may be anathema to the majority of conservation easement drafters, most of who routinely draft provisions stating that all development rights have been “extinguished.” Notwithstanding the seemingly well established position that conservation easements can permanently extinguish or otherwise accomplish the *de facto* destruction of development rights, like the notion of a truly perpetual conservation easement, the “extinguishment” by *fiat* of a development right is also a fiction. This conclusion follows from the fact that all development rights are based on the legislatively enacted planning, zoning, and subdivision laws for the particular jurisdiction in which the land is located. In some cases, even federal laws may be implicated in the development of a given parcel of land. To say that development rights have been “extinguished” is thus tantamount to declaring that one has unilaterally and legislatively revoked applicable land use laws, an obvious impossibility. To the contrary, in legal terms, the grantor-landowner has simply made a contractual promise to the grantee-easement holder that the grantor will not exercise any of the development rights that the easement purports to have extinguished. Thus, in the case of conservation easements, it would be more accurate to

state that the grantor's exercise of the development rights has been "suspended" rather than "extinguished." Other descriptors that come to mind are that the development rights have been made "dormant," "inoperative," or "held in abeyance."¹¹³

Moreover, the use of the specific term "extinguished" could disadvantage the conservation easement holder by creating a legal scenario for an estoppel-like argument.¹¹⁴ That is, it could be argued that because the grantee-easement holder intended and believed the development rights were actually extinguished (i.e., a word that denotes permanence), the easement holder should not later be allowed to receive the value inherent in those development rights when they are reunified with the underlying land upon the termination of a conservation easement. This is particularly important if one takes the position advanced in this article that such "dormant" development rights can appreciate over time in the same fashion that development rights would appreciate on a property unencumbered by a conservation easement.

If the conservation easement states that it "extinguishes" the development rights in the underlying land, that provision could come back to haunt the easement holder in other ways as well. For example, it is possible that after a conservation easement is acquired, the development rights it purported to extinguish may become marketable or tradable. A transfer of development rights program may be created for which the development rights in the conservation easement would have been eligible.¹¹⁵ Likewise, it is also possible that post-easement acquisition mitigation banking programs could come into being so that had the holder not extin-

¹¹³ See McLaughlin's *Rethinking*, *supra* note 91, at 490. Professor McLaughlin notes that the conveyance of a perpetual conservation easement to a government agency or charitable organization could be conceptualized in at least two useful ways: (1) as the conveyance of a right to restrict the development and use of the encumbered land as specified in the easement, coupled with an obligation to enforce the restrictions in perpetuity on behalf of the public; or (2) as the conveyance of the actual development and use rights restricted by the easement, coupled with an obligation to hold those rights in abeyance in perpetuity on behalf of the public. *Id.* She notes further that the termination of a perpetual conservation easement would involve, among other things, the reunification of either that "right to restrict" or the actual development and use rights with the fee title to the land. *Id.* at 491.

¹¹⁴ *But see* *Weston Forest & Trail Ass'n, v. Fishman*, 66 Mass. App. Ct. 654, 660 (2006) (holding that estoppel arguments do not apply to legal challenges against conservation restrictions that are in the public interest).

¹¹⁵ See BREWER, *supra* note 67, at 240 (explaining transfer of development rights programs); see also BYERS & MARCHETTI PONTE, *supra* note 102, at 398 (elaborating on transfer of development rights programs).

guished the development rights, it could have received some form of compensation for holding them in abeyance, or conveying them to the mitigation bank to do likewise. In both the above scenarios, the easement holder would receive some form of compensation from the transaction in question, perhaps offsetting the cost of the easement. Provisions purporting to “extinguish” all development rights, rather than conveying such rights to the easement holder could also thwart the holder’s participation in cutting-edge, anti-climate change programs, or other such critical global conservation strategies. For example, a provision purporting to “extinguish all development rights” could be read broadly to extinguish such “ancillary” development rights as the right to market carbon sequestration credits on eased forest lands.¹¹⁶

Whether an easement holder is free to sell, trade or transfer development rights will turn on several factors. These factors include the easement terms and whether the easement was acquired by donation, in which case selling, trading, or transferring the development rights could affect the perpetuity requirement of the tax code and ultimately the legality of donor tax deductions.

For all of the above reasons, it is the author’s firm position that conservation easement attorneys should never include language in a conservation easement “extinguishing” or otherwise attempting to legally nullify the development rights. Instead, as a corollary to this maxim, the land trust’s attorney should always seek to include provisions transferring all current development rights to the easement holder.¹¹⁷ Such provisions should further attempt to transfer to the holder all ancillary development rights that may exist in the future. For example, the land trust’s attorney could craft language giving the easement holder the right to market carbon credits generated by the eased property should a carbon credit trading system applicable to the eased property develop in the future.

However, transferring the development rights to the holder is

¹¹⁶ See BYERS & MARCHETTI PONTE at 398-99 (observing that conservation easement drafters must consider the impact of language purporting to “extinguish” development rights, as traditionally conceived, on so-called “ancillary development rights,” such as the transfer of carbon sequestration and carbon dioxide credits, and noting further that “[s]ometimes, a holder may not want to extinguish these transferable development rights”).

¹¹⁷ See *id.* at 398-99 (providing alternative easement language in which development rights are transferred to the easement holder rather than extinguished).

only part of the drafting process. The extent the holder is allowed to *exercise* those development rights should be negotiated with the easement grantor. There is a downside to such negotiations, however. For example, if there is any possibility that the easement holder might profit from the exercise of the rights it receives, the appraisal, and consequently the asking price for the easement, may be increased. Nevertheless, even if, during the term of the easement, the holder is prohibited from exercising any of the ancillary development rights it receives, the addition of appropriate language in the conservation easement deed clarifying the holder's ownership of such rights may facilitate the holder's recovery of the appreciated value of those rights if the easement is later terminated. Accordingly, the author recommends that whenever possible, the full panoply of development rights on the eased property in question should be transferred to the holder, rather than be extinguished.¹¹⁸ The various methods by which the holder can attempt to capture the appreciated value of such development rights upon termination of those rights are discussed below.¹¹⁹

D. Capturing Appreciated Development Value Upon Termination

i. Percentage and Appraisal "At Least" Valuation Upon Termination

The preceding observations and recommendations, though important, are by themselves insufficient to ensure that the ease-

¹¹⁸ In a telephone interview, conservation easement expert Professor William T. Hutton stated agreement with the proposition that conservation easements should, as a general rule, transfer development rights to the holder rather than attempt to "extinguish" them. Telephone Interview with William T. Hutton, Professor of Law, UC Hastings College of the Law, and Partner, Coblenz, Patch, Duffy & Bass LLP, in San Francisco, Cal. on June 30, 2006, which took place during the monthly Conservation Easement Roundtable, conceived by Darla Guenzler, Executive Director of the California Council of Land Trusts.

¹¹⁹ See McLaughlin, *Amending*, *supra* note 91, at 1071, 1089. Just as "ark" model conservation easements can be drafted to be more easily terminated than "park" model conservation easements, so too could "ark" model conservation easements be drafted to be more easily amended; provided, however, that such amendments would be required in some fashion to further the conservation goals as originally stated in the easement. *Id.* It must be noted, however, that just as the termination of appreciated conservation easements raises the practical question of how the easement holder is to be compensated for such appreciation, which is the main subject matter of this article, so to does the amendment of conservation easements where the amendment has a conservation-diminishing effect. *Id.*

ment holder is entitled to the full-appreciated value of the development rights upon easement termination. Moreover, as will be discussed in greater detail below, the method of easement valuation upon easement termination, which has likely been incorporated into most easements in existence today, is arguably equally unlikely to achieve this entitlement of the holder. As also discussed below, this is largely the result of easement drafters incorporating into their easements valuation provisions found in the first and second editions of the Conservation Easement Handbook. Accordingly, the drafter must ensure that the proper valuation method will be used to reflect the full-appreciated value of the development rights.

The Treasury Regulations addressing the "division of proceeds" owed to the easement holder upon the termination of perpetual conservation easement are as follows. First, the Treasury Regulations define the easement as a "property right, immediately vested in the donee organization."¹²⁰ This property right has a fair market value that the Treasury Regulations calculate as the difference between the value of the property before the easement and the value of the property with the easement in place.¹²¹ This formula is often referred to as "before and after" valuation. For purposes of valuing the conservation easement at the time of termination, the Treasury Regulations require that a ratio between the fair market value of the easement and the fair market value of the property as a whole (i.e., without the easement) be established at the time of the gift of the easement.¹²² This ratio is frequently referred to as the "x/y ratio," where "x" is the fair market value of the conservation easement, and "y" is the fair market value of the property as a whole, unburdened by the easement. The Treasury Regulations specify that the ratio thus established must remain constant during the life of easement.¹²³ Consequently, for purposes of valuation of the easement upon its termination, the Treasury Regulations state that the holder is "entitled to a portion of the proceeds [from the subsequent sale, exchange, or involuntary conversion] *at least* equal to that pro-

¹²⁰ See Treas. Reg. § 1.170A-14(g)(6)(ii) (as amended in 1988).

¹²¹ See Treas. Reg. § 1.170A-14(h)(3)(i) (as amended in 1988).

¹²² See Treas. Reg. § 1.170A-14(g)(6)(ii) (as amended in 1988).

¹²³ See *id.*

portionate value of the perpetual conservation restriction. . . ."¹²⁴

By using the "at least" language in the "division of proceeds" section, the Treasury Regulations presciently anticipate circumstances in which the fair market value of the conservation easement may increase more rapidly than the fair market value of the underlying property. However, within the context of the Treasury Regulations valuation procedures, the "x/y ratio" acts *only* as a "floor" for purposes of the division of proceeds upon termination. The Treasury Regulations produce this result by only providing that the easement holder is entitled to *at least* a value that equals the same proportionate value of the conservation easement to the value of the property as a whole, as the ratio of the original fair market value of the conservation easement to the property as a whole at the time of easement creation.

The need for an alternate valuation upon termination provision utilizing division of proceeds formulas other than the simple "x/y ratio" based formula from the Treasury Regulations is best explained in terms of appreciation in the value of development rights. This is because the suppression or suspension of development rights is the main reason for implementing conservation easements in the first instance. Stated differently, the best estimate of the economic value of any given piece of real estate is the estimated fair market value of the development rights. This conclusion is based on the safe assumption that in a market of appreciating real estate values, it is not the land *per se* that is appreciating, but instead, the suppressed or suspended development rights. This assumption is correct because appraisers are able to value land, with and without the development rights in place, where the difference between the two values represents the appraised fair market value of the development rights.

Whether the conservation easement has been drafted to expressly preserve the development rights and to allocate them to the easement holder, or whether the easement holder's right to the value of the development rights is by virtue of the holder's

¹²⁴ *Id.* (emphasis added). By way of an example as to how the "x/y ratio" based valuation method might work, consider the following simple scenario: if at the time of its creation, a conservation easement is valued (using the "before and after" formula) at half the value of the unencumbered land, then the easement holder will be entitled to half of the proceeds of a sale upon termination. *See id.*

control and dominion over them, the easement holder is obligated, as a publicly subsidized entity, to capture the full-appreciated value of the development rights upon easement termination. Ironically, using the x/y valuation by itself may thwart the easement holder's ability to capture the full-appreciated value of the development rights by artificially holding the x/y value constant in an appreciating real estate market. In such cases, the landowner is likely to unfairly receive a windfall of profits from the liquidation of the formerly eased land.

The reason for this perverse result can be explained by example. Assume that a conservation easement is imposed on Parcel A. At the inception of the easement, the fair market value of the property without the easement is \$100,000. At the same time, the value of the property with the easement is \$75,000. Thus, the fair market x/y ratio is $\$75,000/\$100,000$ or 75%. As a result, the easement holder is entitled to 25% of the fair market value and the landowner is entitled to 75%. Later, assume that the zoning is changed so that the fair market value of the land is doubled. Using the x/y valuation method and the original 25% to 75% ratio, the easement holder is now entitled to \$50,000, and the landowner is entitled to \$150,000. A problem exists since the development rights, not value of the land, doubled. Because a conservation easement severs the development rights from the underlying land, the easement holder and not the landowner should be entitled to the appreciated value.

The correct valuation in our example requires the property to be reappraised. In so doing, assume the appraiser will calculate the value of the land without a conservation easement at \$200,000. The value of the land with a conservation easement will presumably remain the same, \$75,000. As a result, the proper ratio of $\$75,000/\$200,000$ is applied to the proceeds. The landowner is now entitled to only 37.5% or \$75,000. The easement holder is entitled to \$125,000, or the lion's share of the value of the appreciated development rights. As shown, so long as a "fresh" appraisal is used in an escalating market, the easement holder will gain ground both in terms of percentage and absolute value. Furthermore, the greater the appreciation in the property as a whole, the greater the appreciation for the severed development rights. Thus for an increase to \$300,000, the ratio is $\$75,000/\$300,000$ or 25%. The easement holder is now entitled to

\$225,000. Using one final example, if the y value is \$500,000 and the x value is \$75,000, the landowner is entitled to \$75,000 and easement holder is entitled to \$425,000. Because the landowner's share in the underlying land remains constant, the landowner is therefore losing ground in terms of both percentage and appreciated absolute value.

In understanding the academic literature addressing the issue of the division of proceeds upon the termination of a conservation easement, it is important to note that the same result described above can be achieved using what is best described as the "after and before" method of valuation. In her comprehensive scholarship pertaining to valuation of conservation easements, Professor McLaughlin argues that upon the termination of a perpetual conservation easement, the full-appreciated value of the development and use rights restricted by the easement should be paid to the holder of the easement, on behalf of the public, to be used for similar conservation purposes, and that such value should be determined using the after and before valuation method.¹²⁵ In contrast with the x/y ratio valuation method applied at the inception of the conservation easement, the after and before valuation method is essentially a new appraisal of the conservation easement, applied at the time of the termination of the conservation easement. Using the after and before methodology, the "after" value is the value immediately after the easement is terminated. The "before" value is the value immediately before the land is released from the conservation easement. The difference between the two values is the value of the conservation easement. Again, both the modified before and after valuation (as discussed above in the context of Treasury Regulations based valuations) and Professor McLaughlin's after and before valuation method are essentially fresh appraisals of the value of the conservation easement determined at the time of easement termination.

While the scenarios described above may seem unfair to the landowner, that is not the case. When the landowner willingly put the land under a conservation easement, the landowner presumably received compensation either in terms of a cash payment, or of a tax deduction. To the contrary, it would be patently unfair to the easement holder and to the public, who has finan-

¹²⁵ See McLaughlin, *Rethinking*, *supra* note 91, at 491-99.

cially subsidized both the nonprofit holder and easement acquisition, for the holder to receive less than the full-appreciated value of the development rights over which it has been given absolute dominion and control.¹²⁶

Moreover, if the easement holder were to realize less than its full share of the appreciated value of the development rights, the easement holder would be financially hamstrung in its attempts to replace the terminated easement with an easement of similar scope, quality, and social value because the same market forces that caused the original easement to rise in value would likely have affected the entire market in which the holder operates, leaving the holder with a shortfall with respect to easement purchase prices. In summary, if the conservation easement requires that the holder receive a dollar amount that is based on the same ratio-based percentage established upon execution of the conservation easement, then the appreciated value attributable to the easement, which is an asset that belongs to the public, could pass as a windfall to the landowner.¹²⁷

Unfortunately, the first edition of the Conservation Easement Handbook¹²⁸ included a model conservation easement containing a valuation upon termination provision based solely on the x/y ratio, with no recognition that the holder is entitled to "at least" this amount.¹²⁹ This dangerously oversimplified x/y ratio driven valuation methodology, borrowed from the Treasury Regulations,

¹²⁶ Generally, the public subsidizes easements through the tax benefits provided to donors of easements as well as to donors of cash and other assets to land trusts and to foundations that provide grants to land trusts. The public also clearly subsidizes conservation easements *purchased* by non-profits or government entities because, in either case, public funds (such as tax revenues or donated, and generally tax-deductible funds) are used to purchase the easements. The public also subsidizes easements through government oversight of the non-profit sector.

¹²⁷ See McLaughlin, *Rethinking*, *supra* note 91, at 482-84. Professor McLaughlin recommends that easement deeds be drafted to provide (and the Treasury Regulations be amended to require) that the holder receive proceeds upon termination equal to the greater of (1) the "x/y ratio" and (2) the full-appreciated value of the easement upon extinguishment. *Id.*

¹²⁸ DIEHL & BARRETT *supra* note 102.

¹²⁹ See McLaughlin, *Rethinking*, *supra* note 91, at 482-484, where Professor McLaughlin discusses the fact that limiting the holder's share to the "x/y ratio" established at donation is not mandated by the Treasury Regulations, and, although technically permissible, is contrary to the intent of the Treasury Regulations, which expressly provide that the donation of a conservation easement "gives rise to a property right immediately vested in the donee" and that upon termination the holder must be entitled to "at least" (rather than "only") the donation percentage.

no doubt began to gain popular acceptance in both donated and non-donated easements by virtue of its appearance in the model easement contained in the first Conservation Easement Handbook.¹³⁰ Initially published in 1988, the Conservation Easement Handbook has undoubtedly served as a guide for many thousands of conservation easements. It would be equally interesting and frightening to determine the number of conservation easements that specify the holder receive only the x/y ratio based percentage of the proceeds from the sale upon termination.¹³¹ The number is likely to range in the thousands, amounting to what is likely to be most conservation easements in existence.

ii. Hybrid "Greater Of" Valuation Upon Termination

As explained in *Rethinking*¹³² and the Second Edition of the Conservation Easement Handbook,¹³³ one solution to comply with the Treasury Regulations and to insure that the conservation easement holder receives its full entitlement of the appreciated value development rights is to include in the conservation easement a "hybrid" version of the two valuation methods described above. In stark contrast with the *least of* valuation paradigm mandated by the Treasury Regulations, the hybrid method provides that upon termination of a conservation easement the easement holder is entitled to that portion of the proceeds representing the *greater of*: (1) the fair market value of the conservation easement at the time of the termination, determined by use of the after and before appraisal method described above; and (2) the strict x/y ratio based percentage of the value of the conservation easement to the value of the underlying land unencumbered by the conservation easement as determined at easement inception. Accordingly, it is recommended that a provision mandating this hybrid method of valuing the holder's interest

¹³⁰ See generally DIEHL & BARRETT, *supra* note 102 (recording the x/y ratio based model easement).

¹³¹ See McLaughlin, *Rethinking*, *supra* note 91, at 482-84. Professor McLaughlin argues that even where the easement deed expressly limits the holder to proceeds upon termination equal to the "x/y ratio," the excess value inherent in the easement should pass by resulting trust to the donor or the donor's heirs -- and not to a subsequent owner of the encumbered land. *Id.*

¹³² See McLaughlin, *Rethinking*, *supra* note 91, at 482-84.

¹³³ See BYERS & MARCHETTI PONTE, *supra* note 102.

upon termination be included in all conservation easements.¹³⁴ In

¹³⁴ As noted in Olmsted, *supra* note 1 at 56 n.43:

[D]ifferent versions of valuation on termination provisions notwithstanding, there are some conservation easement attorneys who would argue that to include *any* provision for valuation on termination is tantamount to an admission that the easement is not intended to be perpetual. Indeed, even some of the nation's largest land trusts continue to struggle with this issue: "With regard to the provisions of valuation on termination, there is an ongoing discussion throughout the legal department of the [land trust] whether we should have such provisions. [S]ome people think it critical for enforcement[,] others think that if you provide a mechanism for termination then the easement, by its terms, is not 'forever.'" E-mail from legal counsel for major national land trust (May 17, 2006) (attribution withheld) (on file with author). Note, however, that because the IRS effectively requires that the "extinguishment and division of proceeds" language from the Treasury Regulations be included in tax-deductible conservation easements, this particular discussion of valuation on termination provisions is limited to non-deductible (e.g., purchased) conservation easements. A related concern regarding the development of more effective mechanisms for the conservation easement holder to capture the full, full, appreciated value of a conservation easement on termination has been expressed by Jeff Pidot, Chief of the Natural Resources Division of the Maine Attorney General's Office: "A downside to the preferred formula for distribution of the proceeds [as advocated in this article] is that it may make the easement holder actually *want* to liquidate the easement in order to get a much enlarged share of the proceeds." E-mail from Jeff Pidot, Chief of the Natural Resources Division of the Maine Attorney General's Office (May 21, 2006) (on file with author). The point expressed above is not an argument against the formula for distribution proposed by this article, but rather an argument for applying the appropriate standard when considering the termination of an easement and for providing appropriate supervision of easement holders, whether by accreditation (e.g., the voluntary accreditation program being undertaken by the Land Trust Alliance), by state attorneys general or by court oversight.

Id. (emphasis added). Since the publication of this author's article at *supra* note 1, the author attempted to poll the land trust community regarding its awareness of these issues and of various responses that might be developing. The author submitted a query to the University of Indiana Land Trust Listserv. The question was simple, it essentially asked whether land trusts and their legal counsel are aware of potential under-valuation of the easement holder's share on termination using the "standard" Handbook language (i.e., the valuation provisions from both the HANDBOOK, 1ST ED. and the HANDBOOK, 2ND ED.), and what solutions were being developed to address this problem. *See supra* note 102. As this listserv is extremely active and has a national audience, many responses were expected. Instead, the answer to the question was a resounding silence, suggesting to the author that either the collective participants on this listserv either did not understand the issue, or wanted to put their heads in the sand and ignore it. There was, however, one "off -listserv" e-mail response which contained an excerpt of a previous discussion on the listserv which was relevant to my current query. The excerpt, which was telling in its candor, was as follows:

Yes. I think it successfully allows the holder the greater of the two values of the easement, either at the time of the grant or at the time of the termination. This comports with the IRS' requirement that it be at least the former, while giving the holder a greater share should the extinguished development rights [increase] over time, as is likely. I don't think [landtrusts or their attorneys] were thinking about this in the 1990s or even, for me, until I read Nancy McLaughlin's illuminating article in the Harvard Env. L. Rev. last summer, and so we were just using language that followed the minimum due the holder under the IRS formula but were ignoring the fact that, once the CE is given to the holder, the latter should be entitled to any appreciation in its value over

so doing, not only is the conservation easement holder expressly entitled to the full appreciated value of the conservation easement, but also compliance with the Treasury Regulations is achieved as the *greater of* valuation method logically provides that the conservation easement holder will receive a portion of the proceeds *at least* equal to the proportionate value of the conservation easement to the unencumbered property at the time of inception of the conservation easement.¹³⁵

E. Capturing Appreciated Ancillary Value Upon Termination

Just as the value of traditional development rights held in abeyance by conservation easements can be expected to appreciate greatly over time, so too can the value of any available carbon credits be expected to appreciate. Accordingly, it is incumbent upon the cutting-edge conservation easement drafter to negotiate for provisions in forest land conservation easements which would allow the holder to market ancillary carbon credits generated during the term of the conservation easement or to recover their full-appreciated value upon termination.

As discussed above, recovering the value of appreciated carbon credits will require innovation and creativity on the part of the conservation easement holder. Additionally, despite the apocalyptic consequences of the global warming crisis that are already upon us, it may be some time before all the pieces are in place to maintain fully functioning national and international carbon markets which are available to all potential players. Nevertheless, now is the time to include provisions in conservation ease-

time. Frankly, I'm surprised at my own stupidity on this issue and am glad it is being remedied at the hands of others.

Posting to University of Indiana Land Trust Listserv, <https://listserv.indiana.edu/cgi-bin/wa-iub.exe?A0=LANDTRUST-L> (Oct. 5, 2006) (attribution withheld) (emphasis added) (on file with author).

¹³⁵ See Olmsted, *supra* note 1, at 56. This author suggested that because conservation easement drafters modeled termination on valuation language provisions of the Treasury Regulations proceeds language, found at Treas. Reg. § 1.170A-14(g)(6)(ii) (1986), the drafters failed to draft language entitling the land trust to the greater of the "x/y ratio" based proceeds or the current fair market value of the easement using the "after and before" valuation method. *Id.* Based upon further research and reflection, the author concludes that it is not the Treasury Regulations to blame -- since Treas. Reg. § 1.170A-14(g)(6)(ii) (1986) requires that the holder be entitled to *at least* the value of the "x/y ratio"—but instead interpretations by drafters based on the model conservation easement in JANET DIEHL & THOMAS S. BARRETT, THE CONSERVATION EASEMENT HANDBOOK (Land Trust Alliance 1988).

ments that will insure that the holder has the right to any potential carbon credits during the term of the conservation easement and to the appreciated value upon termination, should this prove possible.

IV. ENABLING LANDOWNER CASH-OUT AFTER CAPTURE OF APPRECIATED VALUE

Most conservation easement drafters follow the language of the Treasury Regulations by specifying in the easement that upon its termination, the holder is entitled to a share of the proceeds from “a subsequent sale, exchange, or involuntary conversion of the subject property. . . .”¹³⁶ While the method dividing the proceeds upon termination of a conservation easement is provided in most conservation easements, albeit incorrectly in most cases, very few of such easements address the “mechanics” of the source or timing of such proceeds.

The core problem is that while the Treasury Regulations, and their analogs in conservation easements, specify the sources of proceeds upon conservation easement termination, they fail to provide how the landowner might be compelled to take the actions that would result the specified proceeds. For example, without some way to compel the landowner to sell, exchange, or otherwise liquidate the underlying property, there are simply no proceeds to divide, even though the easement has been terminated. There is no mention in the Treasury Regulations, or the various treatises on conservation easement drafting, that spell out how to compel a landowner, who chooses to simply continue ownership of the property, to convert the property in a manner that will result in proceeds approximating the fair market value of the property.

Given the potential for a landowner to prevent an easement holder from receiving the holder's fair share of the proceeds of a terminated easement, or any proceeds at all for that matter, it is necessary to draft conservation easement provisions that counter this eventuality. One drafting solution to this problem is to include language in the conservation easement that maintains the easement holder's interest in the proceeds until such time as those proceeds are monetized in a transaction by the landowner.

¹³⁶ Treas. Reg. § 1.170A-14(g)(6)(ii) (1986).

Such provisions should be drafted as to be non-terminable, and to exist for any length of time, no matter how long after termination of the conservation easement.¹³⁷ How such drafting solutions might be played out is examined below.

A. *Perpetual Lien; Deed of Trust; Mortgage*

The perpetual lien is a promising drafting mechanism to insure that the latent monetary value of the proceeds in a terminated conservation easement is preserved until they can be divided between the grantor landowner and the grantee easement holder. Although the author has yet to see an example of perpetual liens in a conservation easement, there is no legal reason why such lien rights on the underlying property in favor of the easement holder could not be included. Because state law governs lien rights on real estate, the first step for the grantee's legal counsel is to determine the precise procedural requirements for creating a perpetual lien. Once these requirements have been determined, they can be included in the appropriate section of the conservation easement. For example, a perpetual lien may be inserted in, or near, the valuation upon termination provisions. In addition to the legal boilerplate required to create a perpetual lien, additional terms can be added. These terms would could specify, if legally permissible, that the creation of the lien is automatic, that the beneficiary of the perpetual lien is the grantee easement holder, including grantee's successors and assigns, that the lien is perpetual (or self-renewing), and that the rights thus created survive the termination of the conservation easement. Because it may be necessary under state law that a formal debt instrument be created for which the perpetual lien can act as security, language should be included which mandates that the grantor landowner will cooperate in every fashion to execute such a formal debt instrument. The language should expressly state that such rights survive the termination of the conservation easement and, further, that the landowner shall cooperate in any way necessary to execute the debt instrument

¹³⁷ See Olmsted, *supra* note 1, at 57 n.44 ("[T]he public interest in terminating an easement might be sufficient in some cases to compel a court to force a sale of the land through eminent domain."); see also McLaughlin's *Rethinking*, *supra* note 89, at 499 n.259 (discussing judicial partition as another potential means of forcing the landowner to partition land or pay the holder for the appreciated value of the development rights).

and to file and perfect the lien.

In addition to perpetual liens, there may be other means of securing the grantee easement holder's interest in the proceeds from liquidation of the formerly eased land. For example, it may be possible to include language in the conservation easement that upon easement termination, obliges the grantor landowner to execute documents prepared by the grantee easement holder that create a deed of trust, secured by the underlying property.

Still other means of creating a security interest in the property underlying the terminated easement may exist. In all such cases, the grantee easement holder should not hesitate in attempting novel approaches to protecting the easement holder's interest in the proceeds from the liquidation of the underlying land. In all of the methodologies for protecting the grantee easement holder's interest in the proceeds of a terminated easement discussed above, some form of notice of a secured interest in the land must be recorded. Such recording would be apparent in any preliminary title report and thus could be an impediment to the liquidation of the land, as no buyer would want to purchase land so encumbered. Such an impediment would be a powerful incentive for the grantor landowner to pay off the easement holder so that the land could be sold or otherwise transferred. These security interests in the underlying land, and any debt instruments attached to them, could be even further strengthened by including language in the easement to the effect that any additional security interests obtained by the landowner must be subordinated to any security interests already in place and which benefit the grantee.

B. Continuing Jurisdiction

An additional means for securing the easement holder's interest in a judicially terminated conservation easement would be to request continued jurisdiction from the court in which the termination was adjudicated. Should such judicial proceeding occur, and the easement is adjudicated to be terminated, the easement holder should attempt to have the holder's interest in the proceeds ascertained by the court. Assuming that a court is persuaded by arguments that the easement holder is entitled to the proceeds under the greater of formula, the court may possibly or-

der an immediate liquidation of the underlying property and allocation of the proceeds. Should the court not do this, the easement holder should ask that the court continue its jurisdiction over the matter until the land is liquidated. At that time, the easement holder could request that the court take control over the proceeds from the liquidation and allocate them as per the court's previous ruling in favor of the easement holder.

C. Neutralizing Developer Transaction Costs and Purchase Price Differentials

i. Financial Partnering

Despite the likelihood that a terminated easement would produce sufficient proceeds for grantor and grantee upon sale or other liquidation, in some instances this may not be the case. To use developer lingo, the sale of such lands (as say opposed to the development of such lands) may not pencil (i.e., result in an acceptable profit margin or cost/benefit analysis). In such instances, it may make sense for the landowner and easement holder to partner in the sale of the land.

A critical, but untested, assumption is that it would be possible for a grantor and grantee already at loggerheads to reach a monetary arrangement that is satisfactory to both parties. A second critical assumption is that the lion's share of the proceeds from the liquidation of the underlying property would go to the grantee.

The following scenario explains how this might work. Assume that the grantor has invested \$250,000 in a property encumbered by a conservation easement. The value of the property under the conservation easement is \$250,000. However, the value of the property unencumbered is \$1,000,000. Moreover, the grantor believes that developing the property can increase its value to \$2,000,000. However, assume that the easement holder has a conservation easement drafted according to the ideas expressed in this article and, therefore, is entitled to the \$750,000 increase in value due to the appreciation of the development rights.

The problem, then, is how a cash-poor grantor can raise the \$750,000 claimed by the grantee so that grantor can develop the property. Further, the grantor must also pay for the startup of

the development on the property, which involves significant sums. The answer, which it is hoped is not heresy to the land trust community, is for the grantee to lend the grantor a portion of grantee's share of the proceeds. Such a loan presumably could be secured using standard practices, for example by a promissory note secured by a deed of trust on the underlying property, or other security interest. The terms of the promissory note would allow for repayment to the land trust in installments based on the timing and amount of return received by the grantor. Thus, the grantee has in effect "partnered" with the grantor on a development project. As a result, both grantor and grantee "cash-out" their full entitlements in the land in question.

ii. Transfer Fees

Thus far, this article has proceeded on the assumption that the development rights of virtually all eased land will appreciate over time. While this is likely to be true in most instances, it is not axiomatic and there are many ways in which such expectations of profit can be undermined. To use one recent example, the devastating effects of Hurricane Katrina, in August of 2005, greatly depressed land values in and around its path of destruction in New Orleans. One result of depressed land values was the creation of a negative price differential in which sellers of devastated land could not obtain purchase prices sufficiently large enough to allow them to purchase comparable properties elsewhere. The same price differentials could also affect land trusts which find themselves with lands or conservation easements devoid of conservation values, and worth so little that they cannot be sold to allow re-deployment in unaffected markets elsewhere.

With the effects of global warming manifesting themselves with greater frequency and intensity every day, one can only expect that extreme weather events such as Hurricane Katrina will increase in the future.¹³⁸ As the previous methods of neutralizing developer transaction costs have assumed a near inexorable increase in real estate values, the method in this section will theo-

¹³⁸ See generally BELL & STRIEBER, *supra* note 5 (examining global warming and its potential catastrophic future impacts); BOB REISS, *THE COMING STORM: EXTREME WEATHER AND OUR TERRIFYING FUTURE* (Hyperion 2001) (concluding that extreme weather and catastrophic weather may result in the future a result of increased greenhouse gases released into the atmosphere by humans).

retically operate in either escalating or downsizing real estate markets. This method also takes into account escalating markets where the developer has, nevertheless, acquired such a small stake in the eased land that the developer cannot simultaneously maintain the debt load on the property, begin construction, and "pay-off" an easement holder entitled to the lion's share of the appreciated development value.

This method is typically referred to as "transfer fees." Transfer fees function much like property taxes. For example, after a parcel of land has been developed, a developer drafts a covenant requiring that on each transaction of a unit of real estate in the particular development the buyer, seller, or both, must pay a proportion (e.g., .25%) of the purchase price to the developer, the land trust, or both. Such covenants are recorded in the chain of title for all residential units, and perhaps commercial units, in a development. The funds generated from such transfer fees can be used for any number of beneficial purposes, including paying a land trust which formerly held an easement on the developed land, the full value of the previously held appreciated development rights.

Although this author has only witnessed transfer fees imposed by a developer, there would seem to be no reason why a transfer fee provision could not be drafted in a conservation easement. For example, such a provision may require that upon termination of a conservation easement, the underlying landowner(s) must draft and record transfer fee covenants in which the land trust is the beneficiary. Among other benefits of such an approach, the incoming transfer fees might allow funding for the fungible and mobile conservation easements which this article suggests may become a necessity as climate change, or other catastrophic human caused global events, begin to destroy or force the migration of species and ecosystems that, in a different world, might have received permanent protection from a single, perpetual conservation easement.

The primary drawback to transfer fees is that they antagonize a number of interests. First and foremost, the sellers and buyers of real estate in a development with a transfer fees covenant may find such a *de facto* tax objectionable. Similarly, the real estate brokers' community tends to dislike transfer fees as they represent a potential brake on the real estate market. Finally,

special interests groups may be concerned that even though transfer fees are usually only placed on mid to high-end real estate developments, they may someday be imposed on low income housing, making such housing no longer financially available to low income buyers.¹³⁹

¹³⁹ See generally Olmsted, *supra* note 1. Everyone does not welcome the imposition of transfer fees. First and foremost, property owners are likely to object to the additional cost of a land purchase created by transfer fees. *Id.* On the other hand, because it is the most beautiful and desirable real estate that will have been protected by subsequently terminated conservation easements, such lands will most likely be developed and marketed as luxury home-sites, with such “product” attracting wealthy buyers more than able to pay the transfer fee. *Id.* Perhaps a greater threat to the use of transfer fees comes from governmental opposition to various entities imposing a *de facto* property tax on purchasers of residential real estate. For example, California has enacted legislation, codified as California Civil Code § 1368, which provides that “neither an association nor a community service organization or similar entity may impose or collect any assessment, penalty, or fee in connection with the transfer of title or any interest except for the following” CAL. CIV. CODE § 1368(c)(1) (2007). Fortunately, this statute can fairly be read not to apply to land trusts. Since the publication of *Capturing the Value of Appreciated Development Rights on Conservation Easement Termination*, *supra* note 1, the author has become aware of two major subdivisions in northern California in which transfer fees have been successfully imposed upon property owners. In one instance the developer agreed to impose fees upon residential units in a luxury resort development as part of a settlement reached after local environmental groups sued the developer to stop the development. Under the settlement, the development was allowed to proceed, and the transfer fees were assigned to a local land trust for acquisition of open space and natural areas. California statutory law notwithstanding, practitioners in other states should beware of similar statutes with potentially broader reach. Despite the possibility of such a legislative backlash, transfer fees are nevertheless being utilized in the other parts of the country as well, often under the nickname “flip fees.” The following post on the University of Indiana Land Trust Listserv is informative on the subject:

Lake Forest Open Lands Association (“LFOLA”) has completed three conservation developments in which nature preserves adjacent to the residential lots have been funded through transfer assessments. The transfer assessments are 50 basis points or \$5 per \$1000 of consideration on the sales price. They are paid by the buyer and LFOLA has lien rights to enforce the assessment provision. We believe that it has worked very well. Since it is a one-time assessment there seems to be little resistance and we are not aware of any loss of sales resulting from the transfer assessment. Obviously, it works better in high-end developments than in lower price ones.

We have not done it in connection with typical conservation easements, but I think it is worth trying, in lieu of the standard endowment request. I have been concerned for quite a while that endowments will get spent (or invested poorly) and won't be there when needed. The transfer assessments, on the other hand, will produce a stream of income into the future that will increase as values increase.

While our experience indicates that there is little resistance in the conservation development context (probably because people who purchase properties in the conservation development realize that they are getting the benefit of living next to a nature preserve and that someone has to pay for its maintenance), I'm not sure that reasoning will apply to the typical conservation easement, where the purchaser may feel that he or she is already suffering from the burden of the conservation easement that may benefit others.

As intimated above, transfer fees could conceivably create “bridge” funding for the re-deployment of conservation easements that are terminated as a result of extreme and catastrophic weather events that are caused by global warming and global climate change. Nevertheless, the utilization of transfer fees for such beneficial purposes does not come without the risk of perverse and unintended consequences. For example, it is easy to imagine a developer drafting transfer fee covenants in such a way that the developer himself is a major beneficiary. In a worst case scenario, a developer could use the proceeds from transfer taxes to pay exactions and other governmentally imposed fees and taxes that would normally be paid out of the his pocket. Thus, the developer could achieve a “double-dip” scenario, in which he is able to pursue his development, without actually paying the taxes and exactions which go to the public good and which normally are a part of a land developer’s cost of doing business. In order to ensure that the ability of land trusts and other non-profits to benefit from transfer fees is not curtailed by a small group of cash-strapped developers that are abusing the system, it is necessary to constantly watch for, and attempt to prevent the double-dip scenario.

V. CHANGING CONSERVATION EASEMENT PRACTICES IN THE AGE OF GLOBAL WARMING

A. *Baseline Documentation: A Measure of What Has Been Lost?*

The looming threat of climate change also raises significant questions about the easement practice of “baseline documentation.” Baseline documentation is a critical component of any conservation easement acquisition project. Indeed, the current Conservation Easement Handbook devotes an entire chapter to the subject.¹⁴⁰ As explained in the HANDBOOK, baseline documentation provides “detailed information on the condition of the property—relevant to the terms of the easement—at the time the

Posting of George M. Covington to University of Indiana Land Trust Listserv, <https://listserv.indiana.edu/cgi-bin/wa-iub.exe?A0=LANDTRUST-L> (Oct. 27, 2006) (emphasis added) (on file with author).

¹⁴⁰ See BYERS & KARIN MARCHETTI PONTE, *supra* note 102, at 100-15 (explaining the role baseline documentation plays in conservation easement acquisition).

easement is transferred, and may be added to when conditions change.”¹⁴¹ The primary purpose of baseline documentation is to provide a basis upon which the easement holder can determine if the terms or conditions of the easement have been violated. As the HANDBOOK explains, “[i]f the condition of the property has been fully documented at the time the easement is transferred, the holder has an accurate record on which to rely if controversy arises about any future damage to a protected condition.”¹⁴²

In addition to the practical stewardship considerations described above, baseline documentation is also a legal requirement when the donor of the easement seeks to take a tax deduction based on the value of the donated easement. So important is the baseline documentation, that the Treasury Regulations specify the timing of its preparation and transmittal from the donor to the holder. Specifically, Treasury Regulations require that the donor prepare baseline documentation of the property’s condition as of the time of the donation and that such documentation be provided to the holder prior to the date of the gift.¹⁴³ The Treasury Regulations further specify the standards for the sufficiency of the baseline documentation, i.e., “documentation [must be] sufficient to establish the condition of the property at the time of the gift,” as well as what sorts of information the documentation *may* include.¹⁴⁴

By way of providing a sense of what information baseline documentation may include and the amount of care and effort that goes into compiling it, the following list, taken from the HANDBOOK, is illustrative: (1) date the baseline documentation was prepared; (2) authorship and qualifications; (3) donor’s and holder’s statements acknowledging the accuracy of the representation of the property’s condition; (4) background information; (5) property description; (6) easement summary; (7) legal information; (8) conservation values; (9) maps or plans; and (10) photo-

¹⁴¹ *Id.* at 100.

¹⁴² *Id.*

¹⁴³ See BYERS & KARIN MARCHETTI PONTE, *supra* note 102, at 100 (illuminating the requirements for baseline documentation); Treas. Reg. § 1.170A-14(g)(5)(i) (2008) (“[T]he donor must make available to the donee, prior to the time the donation is made, documentation sufficient to establish the condition of the property at the time of the gift”).

¹⁴⁴ Treas. Reg. § 1.170A-14(g)(5)(i) (2008); see also BYERS & KARIN MARCHETTI PONTE, *supra* note 102, at 104 (expanding on the types of permissible types of sufficient documentation).

graphs.¹⁴⁵

Clearly, adequate baseline documentation is a critical component of any easement holder's stewardship program. In the absence of baseline documentation, the easement holder is legally hamstrung in the event of violation of the easements terms because there is no documentary or physical evidence to support the testimony of the parties as to the condition at the time the easement was created. Moreover, baseline documentation becomes increasingly important over time, because if the easement is truly "perpetual," it will out-live the original parties to the easement transaction, leaving no one to provide even testimonial evidence as to the baseline conditions.

Under a stable climate regime, baseline documentation makes complete sense. However, for purposes of the present article, the unavoidable question arises as to what value baseline documentation might have in a world that we know to a scientific certainty will soon be experiencing abrupt and profound changes to virtually all of its major natural systems as a result of human-caused climate change. Such climate changes will affect weather patterns, average local temperatures, chemical compositions of air and water, sea levels, ocean currents and timing of the seasons. These changes will, in turn, manifest themselves in a vast and ongoing array of alterations to the Earth's surface. Formerly dry land will become inundated with rivers and oceans. Catastrophic weather events, such as hurricanes, will scarify the Earth's surface, destroying many life forms in the process. Flooding will occur, likewise rearranging the landscape. And, as is already happening, glaciers will melt, causing the oceans to rise, altering their pH and salinity and decreasing the Earth's albedo¹⁴⁶ to create feedback loops,¹⁴⁷ triggering even more global

¹⁴⁵ See BYERS & KARIN MARCHETTI PONTE, *supra* note 102, at 106-07 (listing the types of information that compose baseline documentation).

¹⁴⁶ See KOLBERT, *supra* note 5, at 29-31. The measurement of reflectivity, or "albedo," is calculated by dividing reflected light by incident light. *Id.* Ironically, snow has the highest albedo of most surfaces on Earth while water has one of the lowest albedos. *Id.* Thus, the melting of the polar ice packs represents not only the loss of reflectivity of solar energy, but also a tremendous increase in the absorption of solar energy. *Id.*

¹⁴⁷ See generally KENDAL MCGUFFIE & ANN HENDERSON-SELLERS, A CLIMATE MODELLING PRIMER (John Wiley & Sons, 3d ed. 2005) (explaining scientific climate modeling in laymen's terms); NATIONAL RESEARCH COUNCIL, UNDERSTANDING CLIMATE CHANGE FEEDBACKS (Nat'l Academies Press 2003) (discussing climate feedbacks in a highly technical manner).

warming. In addition to these types of changes to the Earth's physical infrastructure, climate change will produce equally dynamic, dangerous, unpredictable and irreversible changes in the Earth's flora and fauna. Faced with the imperative to adapt, migrate or die, the Earth's living creatures, and the ecosystems in which they live, will do just that, with the most frequent "option" being death. The migrations of those species that survive will inevitably alter the intricate lattice-works of species interactions that have existed for millennia.

Baseline documentation can serve another purpose. In a world where we know that every property "protected" by a conservation easement will, to some degree, be altered by climate change in a way that "violates" the intent and/or terms of the easement, baseline documentation can serve as a scientific record of ecological change, rather than as an enforcement mechanism for wayward landowners. Accordingly, landowners and land trusts should continue their "standard operating procedures" and carefully compile baseline documentation. On a positive note, if a clearinghouse-type organization could be formed, or if an existing organization took over the project, the data collected in baseline documentations could be compiled and analyzed to determine the routes and rates of pole-ward species migrations. Armed with such information, it may be possible to locate conservation easements along migratory routes to be used as migration corridors, migratory "rest stops," or even permanent refuges for successfully migrated species. On a less positive note, the collective baseline data from land trusts could also help determine the rate and extent of species extinctions. Such baseline data, when combined with similar data collected by various conservation organizations and governmental entities, would serve as a "report card" on the effectiveness of our efforts to preserve species diversity in the face of the reverberating effects of climate change. If nothing else, we can use this information to show future generations what we have lost.

B. Just Passing Through: When All Species Are "Invasive"

Obviously, climate change will create tremendous challenges

for the survival of Earth's ecological treasures.¹⁴⁸ Many of these challenges will relate directly to individual species or species communities. For examples, changes in climate may so disrupt the phenology of species in a community that they must individually, or collectively, face the adapt, migrate or die imperative.

One such challenge that must be addressed by conservation easement drafters relates to invasive or so-called exotic species. Invasive species are not a new problem. They present a particularly thorny set of problems for landowners, easement holders and easement drafters, even under the assumption of a stable climatic regime. First, invasive species come in all shapes and forms. They may appear in the form of microbes, insects, rodents, reptiles or birds. Each such invasive species will present its own unique problems in terms of how to mitigate, remove, or contain its damages. Second, invasive species are opportunistic, unpredictable and unimaginably inventive in how they might manifest themselves. Some invasive species are introduced intentionally, such as ornamental plants and song-birds. Other invasive species take advantage of disturbances of natural ecosystems, for example, by tilling the ground for farming, cutting trees for logging, and even by extreme weather events.¹⁴⁹ Additionally, invasive species may be carried by the wind, in the digestive tracts of birds, in the ballast water of ships, on the wheels of vehicles, and even in the landing gear of jets.¹⁵⁰

However, climate change threatens to make the problem much more severe. Climate change may force species that are natural in one area to migrate to other areas where they become invaders of the ecosystem. Once established in their new locations, the successfully migrating species may out-compete the pre-existing species, or, in some other fashion, disrupt and permanently alter

¹⁴⁸ Although plants are discussed here, the same two fundamental problems exist for animal, insect, aquatic, oceanic, and even microbial life as well.

¹⁴⁹ See, e.g., FLANNERY, *supra* note 5, at 98 (noting that as the result of a series of mild winters in the Arctic, the spruce bark beetle has "ragged" out of control in southern Alaska, killing some 40 million trees in the past fifteen years -- an insect kill greater than any other in North American recorded history).

¹⁵⁰ See ALAN BURDICK, *OUT OF EDEN: AN ODYSSEY OF ECOLOGICAL INVASION* (Farrar, Straus & Giroux 2005) (noting among other invasion strategies of various species, the unique ability of Guam's brown tree snake to travel by curling up inside the landing gear of jets); see also *INVASIVE SPECIES IN A CHANGING WORLD* (Harold A. Mooney & Richard J. Hobbs eds., 2000) (exploring the background of problems associated with invasive species); James H. Brown et al., *Aliens Among Us*, *CONSERVATION*, Apr.-Jun. 2007, at 14 (questioning leading thinkers on assumptions about invasive species).

their new ecosystem. In a climate-changed world governed by the adapt, migrate or die imperative, we may find ourselves surrounded by an ongoing form of "ecocide," as more rapidly migrating species of every variety and type overtake and out-compete existing species.¹⁵¹ The distinction between native and invasive species depends upon the stability of ecosystems over time and the rate of ecosystem change. In a world where species migration and ecosystem change becomes the norm, the distinction may fade and almost all species will be seen as just passing through.

This poses a significant challenge for land trusts and their management. At present, most conservation easements contain provisions addressing invasive species. Sometimes such provisions are merely a list of invasive species that the landowner is prohibited from introducing onto the property. Such invasive species may include ornamental or food plants. Other provisions may grant either the landowner, the easement holder, or both, the right to eradicate invasive species. In some instances, easements may impose an affirmative duty on the landowner or the easement holder to eradicate invasive species. Where eradication is mandatory, the party bearing the obligation is placed in a position of accepting potentially devastating financial risk, as eradication of very aggressive invasive, or exotic species, can be extremely expensive. Accordingly, such provisions often end up negotiated out of the easement. Working land conservation easements, such as easements on ranches, farms and forests, are particularly likely to have provisions addressing invasive species. There are numerous reasons for this, including the following: the owners of working lands are most likely to have a continuing presence on the property, and therefore are in the best position to monitor for the presence of invasive species; the disturbance of soil on working lands often provides a "landing" site for opportunistic invasive species; and the crops grown on working lands often provide invasive species with a smorgasbord of food.

While natural and human-made barriers may slow the march of invasive species in a climate changed world, the increased appearance of invasive and exotic species is likely to be sufficient to generate enormous stewardship problems for landowners and

¹⁵¹ See generally BYERS & MARCHETTI PONTE, *supra* note 102 (explaining some of the difficulties surrounding conservation easements).

easement holders. Such problems could possibly be avoided by creative conservation easement drafting. However, other than the broad brush stroke “solutions” that grant a party to the conservation easement the right to eradicate invasive species or impose upon a party the obligation to do so, the author has seen no examples of creative drafting in either a conservation easement, or in a conservation easement drafting guide.

Accordingly, easement drafters must take careful note of how invasive species are affecting eased land and draft countering provisions that utilize the best science and utmost creativity. For example, an attorney representing either a landowner, or a land trust, in a conservation easement negotiation, would be well advised to include some immunity from contractual liability for his client's possible expenses of eradication of invasive/exotic species, as well as immunity from contractual liability for the expense of restoration and remediation to repair the damage inflicted upon existing ecosystems by invasive/exotic species. Likewise, an attorney representing a land trust should include language in the conservation easement in which the parties acknowledge and agree that climate change may result in colonization of the eased land by invasive species, but such colonization is agreed not to render the easement purposes impossible or impractical to carry out, and thus subject the easement to termination.

The problems that arise from dealing with invasive species may be far more complex than described above. In the coming age of global warming and global climate change, land trusts will no longer be able to rely on simple lists of invasive species to be eradicated or otherwise neutralized. Instead, land trusts will likely find themselves entrusted with making difficult decisions about which invaders to deter and to what extent. In other words, rather than automatically attacking colonization's of species that were previously regarded as invasive and, therefore, by definition, a threat to the existing ecological mix, land trusts, in conjunction with scientists and ecologists, should develop the best management practices under which a land trust may exercise judgment in deciding between which so-called invaders might be welcomed as a replacement species for those leaving, and which invaders must be repelled, lest they devastate what remains of the ecosystem that is sought to be protected.

CONCLUSION

One can no longer deny that humanity has become a force of nature. The human population has increased exponentially over the past century, so that today, there are four billion of us on this planet, jostling for room and resources. As the population has increased, so have human appetites. To satisfy the ever increasing need for food and shelter in developing countries, and the demand for conveniences and luxuries in industrialized countries, we have devoured much of the earth's bounty. Our history has become one of soulless plunder as we raid land and sea alike. Some of this plunder is performed crudely; for example, when villagers in undeveloped countries set fire to tropical forests to clear the land for farming. While such plundering occurs on a human scale, industrialized countries have created armies of gigantic machines. So large and powerful are these machines that they can literally rip the tops off of mountains in search of coal. Unfortunately there is a price for humanity's vast appetite. As humanity carves up and exploits natural landscapes, we deprive species of the delicately balanced ecosystems that they need to survive. So immense are our appetites and so effective are our machines, that we have, in effect, strip-mined the majority of our natural terrestrial and oceanic resources. As immense and sustained as our constant depredations have been, they are now becoming dwarfed by a formerly ignored by-product of our collective gluttony, the pollution of the atmosphere with greenhouse gases which are causing our planet to warm at an unnatural rate. This global warming has now put us at the tipping point of many major natural systems. At the poles, the ice and the earth's great glaciers are melting ever more rapidly. Sea levels are expected to rise all around the globe, depriving millions of people of food and shelter. All of earth's species will be affected by global warming, necessitating that they adapt, migrate or die. Such death will occur not only on the scale of individual organisms, but at the species level as well. Acting as an out of control force of nature, we are creating one of the greatest mass extinctions in earth's history.¹⁵² Although it has taken some time, perhaps too much

¹⁵² See EDWARD O. WILSON, *THE FUTURE OF LIFE* (Knopf 2002) (predicting future loss of species caused by humans); For a brilliant and poetically written description of Earth's biodiversity and an urgent plea to save it, see also EDWARD O. WILSON, *THE CREATION: AN*

time, the land trust community is finally gearing up to combat global warming.¹⁵³ This article proposes a number of ways that land trusts can do this. For example, land trusts can employ non-perpetual ark easements and recover the full monetary value of terminated conservation easements, so that these easements can be re-deployed elsewhere. This is only part of what the land trust and conservation community can do to fight global warming and to mitigate its consequences to all earthly species. While such changes may seem small, they are also a start to what will be ever more determined and effective strategies to combat global warming.

APPEAL TO SAVE LIFE ON EARTH (W. W. Norton & Company 2006) (describing Earth's biodiversity and pleading to save it).

¹⁵³ See generally *supra*, notes 2-4 (discussing the environmental changes that have prompted changes to the manner in which conservation easements are drafted).