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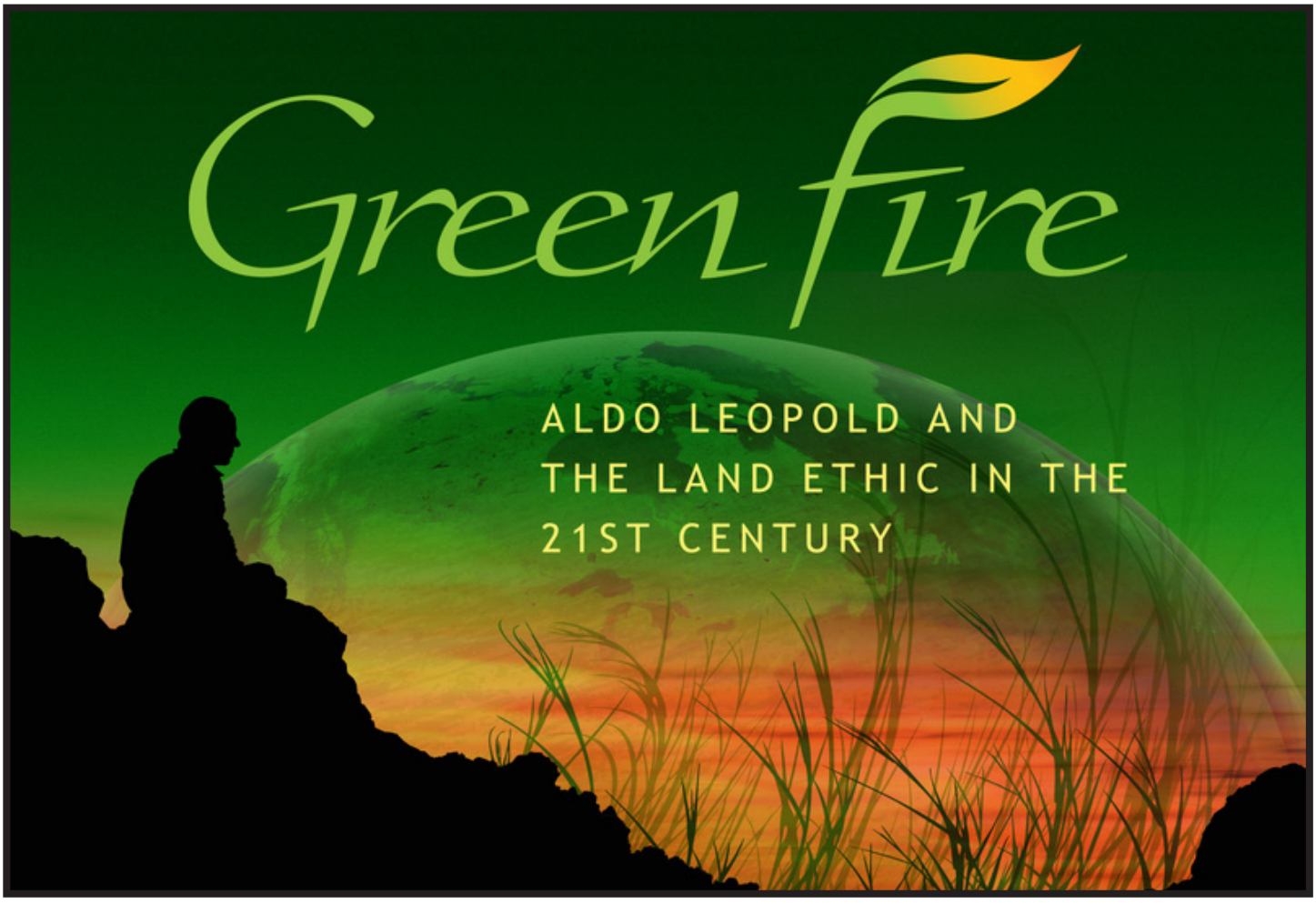
Expanding our Natural and Civic Imagination

MINDING NATURE

a journal exploring conservation values and the practice of ecological democratic citizenship



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Title Screen from *Green Fire:*
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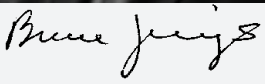

THE WISDOM OF CONSERVATION

TO BRING TOGETHER A DIVERSE GROUP of reflective, articulate thinkers and focus their vision and voices on an enduring theme is a fascinating publication project. Such a venture is not without risk; some attempts have been dreadful—how many compilations are there that might be entitled *Banalities of the Rich and Famous*? Occasionally, however, such collections succeed spectacularly. One nice example of this genre, a volume entitled *Living a Life of Valu*e, edited by Jason A. Merchley, came to my attention a few years ago. Recently, I have been immersed in the splendid new book, *Moral Ground: Ethical Action for a Planet in Peril*, edited by Kathleen Dean Moore and Michael P. Nelson. Run, don't walk, to your bookstore and read it, wrestle with it, take it to heart. If enough people do that, some dark times looming on the horizon of 2011 and beyond could be transformed. For despite the emphasis on ethics in its title and the monumental seriousness of its subject, much written in the essays of this book calls us to joy as well as to duty.

Moral Ground is one item in a set of resources that enables us to search for and recapture what may be called "the wisdom of conservation." I like to unpack that phrase in the following way: Wisdom is knowledge tempered with judgment, expertise chastened and humbled by experience. And conservation is the practice of world making and world tending, turning spaces into places. Temporally, conservation is a bridge between past, present, and future. It is a remembering of what has come before, a will to act in order to protect, preserve, and care in the here and now, and an imagining of the human and natural values to be realized by those who live after us.

The philosophy of nature and biology, the history of conservation science, policy, and practice, environmental theology, ethics, and aesthetics—together these fields comprise an intellectual tradition of profound importance. And in this tradition resides the wisdom of conservation, the moral ground that we seek. This issue of *Minding Nature* offers a number of perspectives and modes of exploring that tradition, using it meaningfully, perpetuating it.

Begin with our cover image, the logo for the new documentary film *Green Fire*. Despite Aldo Leopold's importance as a central figure in twentieth century conservationism and environmental ethics, there has not been a full-length documentary film exploring his life, philosophy, and legacy. That will change next year with the release of *Green Fire: Aldo Leopold and the Land Ethic in the 21st Century*, which is co-produced by the Center for Humans and Nature, the U.S. Forest Service, and the Aldo Leopold Foundation. Curt Meine, Director of Conservation Biology and History at the Center, serves as the on-screen "guide" and narrator for the film. *Green Fire* seeks to provide viewers with a basic historical biography of Aldo Leopold while simultaneously surveying the contemporary relevance and creative evolution of the conservation ethic that Leopold defined. The film is scheduled to premiere on February 5, 2011 at the National Hispanic Cultural Center in Albuquerque, New Mexico. *Green Fire* will allow thousands of viewers to become ac-

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EDITOR

quainted with the origins, evolution, and contemporary expressions of the land ethic, and to engage in the work of advancing it for the next generation.

While *Green Fire* was in production, The Center for Humans and Nature, in collaboration with the University of South Carolina and other groups, was also making a documentary film on the success of land trusts and conservation in the South Carolina lowcountry, entitled *Common Ground*. A leader of that effort, William Bailey, reflects on the adventures of making this film, the story it tells, and the extraordinary landscape and people that it celebrates.

In their essay, the co-editors of *Moral Ground*, Kathleen Dean Moore and Michael P. Nelson, pose the unsettling question of whether another tradition of discourse, the Western tradition of moral philosophy, is serviceable at this present moment of peril. It may not be if it does not contain a sufficiently robust way of grounding the tremendous ethical obligations and imperatives that we now face. If a challenge is unprecedented, so, too, our conceptual understanding and motivation may have to be revised in order to meet it. Here the tradition and wisdom of conservation may provide the supplement and corrective that ethics needs.

Much the same theme was discussed at the recent Ethics of Sustainability forum that was inspired by *Moral Ground*. Gavin Van Horn discusses the highlights and themes of that conference and so returns to the series of questions raised by Moore and Nelson.

Writing on the occasion of the publication of the second edition of his classic biographical study of Aldo Leopold, Curt Meine reflects on the dynamism of the American conservation field since Leopold's time and during his own thirty-year career in the field. The tradition and wisdom of conservation are dynamic, not dogmatic. Conserving is not the same thing as conservatism; respecting tradition does not entail traditionalism.

In his essay on bioethics, Peter Whitehouse recalls Leopold's legacy in his own life and work and in his collaboration with Van Rensselaer Potter. The intersection between conservation and medicine-between environmental ethics and bioethics-illustrates another way in which the wisdom of conservation permeates the artificial boundaries between disciplines and professions.

Finally, Julianne Lutz Warren reminds us of the literary and utopian registers that have nourished the wisdom and ethics of conservation. In particular, she brings the inquiry into the domain of economic ideas, myths, and desires. Among other things that it does, economics is fundamentally about debt, what we borrow from the earth, and time. This is the time of reckoning, when debts come due.

Debts are coming due. How difficult it is to face up to this and to adjust to it in the American human economy of financial crisis and tenacious, outrageous, and dangerous unemployment? But consider how much more difficult it is going to be to face up to it in the natural economy of the planet. If ever our economics and our politics needed the wisdom of conservation, surely that time is now.

The Perfect Moral Storm, When the Life Rafts are on Fire

By KATHLEEN DEAN MOORE
AND MICHAEL P. NELSON

The climate crisis and its attendant environmental disasters have caught the world in the dangerous crosswinds of ecological disruption and human irresponsibility. We are challenged to make world-altering decisions about our current life choices and our obligations to planetary and human futures. But when philosophers race across the pitching deck to launch the moral theories that we have long relied on in times of difficult choices, we find that the life rafts themselves are on fire. It is possible to argue that among the coming casualties of the climate change crisis may be Western ethics-as-usual. For we find that our usual ways of thinking about moral obligations may not be robust enough to define our obligations at a time when the usual ways of thinking have allowed us to drift into the teeth of this terrible storm.

This is a serious, even future-threatening, problem. As philosophers are the first to explain, any argument that reaches a conclusion about what we ought to do will have at least two premises. The first is empirical and descriptive, often based on science. Climate scientists have achieved a global consensus on the first premise: Climate change is real, it is dangerous, it is upon us. But to reach a prescriptive decision requires a second premise. This is the normative premise, an affirmation of our moral responsibilities to the human and planetary future in the face of this danger. When the normative premise is inchoate—or worse, when moral discourse has gone missing from the public debate—we should not be surprised to find ourselves, and entire nations, unable to respond. Saving a fully thriving future will require not just good science and new technology, but perhaps the greatest exercise of moral imagination the world has ever seen.

Given this, we launched what we call the Second Premise Project, with the goals of amplifying the national discourse about moral obligation in the face of the climate emergency and perhaps achieving a global moral consensus as robust as the scientific one. As part of that project, we called for the testimony of the world's moral and intellectual leaders, asking one hundred people of wisdom—theologians, poets, philosophers, scientists, indigenous wisdom-keepers, statesmen, teachers, and activists—to reflect on these questions: Does the world have an obligation to the future to avert the worst effects of a lurching climate and impoverished environment? If so, why? What explains our obligation? From every continent save Antarctica, they sent in beautiful, moving, carefully crafted moral argument.[1] (If they didn't, we scoured their publications for important answers and reprinted them.) We published this collected work as *Moral Ground: Ethical Action for a Planet in Peril* (Trinity University Press, 2010), and we are using it to inform and energize town hall and radio discussions across the nation.

In the meantime, it is possible to draw from this collected wisdom some ideas about the directions that public discourse about public and personal responsibility might well take. Drawing on the arguments col-

lected in *Moral Ground*, this paper (a) summarizes claims about the insufficiency of several traditional Western moral theories to define the moral imperatives of the planetary crisis, (b) suggests some of the conditions that a sufficient theory should meet, and (c) puts on the table for discussion four disparate ideas for how we might more usefully think about our moral obligations: responsibilities based on a people's right to culture, responsibilities based on gratitude, responsibilities grounded in personal integrity, and responsibilities that grow from love.

> "...the Western world is undergoing a fundamental change in our answers to basic philosophical questions: What is the world? What is the place of humans in it? How, then, shall we live?

THE TROUBLE WE FIND OURSELVES IN

We can begin by acknowledging that human decisions have landed us in this environmental crisis, however much the effects of human decisions may or may not be magnified by naturally changing conditions. Whether this is a result of widespread human failure to live up to the moral standards set by the worldviews we profess to believe, or whether the moral standards themselves have not asked enough—or the right things—of us, or indeed, whether the worldviews and consequent moral guidance have actively led us to disastrous decisions does not need to be settled here. There is surely some truth in all these explanations. The tragedy may be that generally good and well-meaning people, making what they can argue are sensible decisions, have created an instability that threatens to destroy the planetary conditions for human and other lives in all their abundance and variety.

In this context, usual ways of Western thinking about ethics may not be able to help us. Consider, for example, utilitarianism. One would think that a consequentialist theory, with its exclusive emphasis on the future results of an act, would be ideally suited to guide thinking about our obligations to the future. But what a morass utilitarian thought about climate change has become. How does one weigh the benefits and burdens of a decision when the benefits are here and now and the burdens far away in place and time? Can we discount—and to what degree—the costs to the future? How does one factor in the costs to nonhuman life? Does cumulative human happiness trump considerations of justice? Are we to weigh costs to this generation against costs to the next, the next one hundred, an infinitude of generations? How do we calculate the benefits and burdens when we have only the slightest idea of how our decisions will play out in the confused seas of the future? If our well-meaning decisions cause some potential persons never to be born, have they been harmed? Is it better to be born into an awful life than never to be born at all? These are questions that utilitarianism itself cannot answer.

And then there is this: Critics point out that individual sacrifices will in all likelihood have a negligible effect on stabilizing the climate. If so, utilitarianism struggles to ask anything of us at all. Sometimes it seems that climate change has taken all the objections to utilitarianism raised by our undergraduate students and given them monstrous life. The greatest of the monsters is hopelessness.

A number of philosophers—notably Dale Jamieson and J. Baird Callicott—point out how difficult it is for traditional theories about rights to guide our thinking about the rights of future generations. To paraphrase Jamieson: We understand that when Jill steals Jack's bicycle, Jill has violated Jack's property right. But when, say, the cumulative effect of the lives of 3.2 billion Jills means that an indeterminate number of Jacks a hundred years in the future will not be able to own a bicycle, who has violated what right, and whose right is it? And what sense does it make to assign people rights when the people in question don't even exist?

If rights are a matter of the relative claims of individuals who are in a position to harm one another as they compete for scarce resources (as philosophers have held for hundreds of years), then climate-change ethics may not meet the basic conditions of a discourse of rights. *Competition for scarce resources?* Check. *Relative claims of individuals?* Maybe not. The climate change crisis puts an entire generation in competition with its posterity; it pits one culture against another; it asks one nation to answer collectively for the harms it has done to another. *Individuals who are in a position to harm one another?* Again, maybe not. An economist famously asked, "What has posterity ever done for me?" But we may ask the reverse: "How is posterity ever going to hurt me?" It's hard to imagine the revenge of the future against the past (although

it might be a salutatory exercise). So it would seem that if we want to talk about rights claims in regard to climate change—and we may very well want to do this—we will need to be talking about something that differs in some important ways from traditional rights theory.

But there may be a larger point to make about the insufficiency of traditional Western moral theories to guide us in a time of climate change. Taking a global view, scientists tell us that the Earth's planetary systems are approaching a tipping point—a time of dramatic and irreversible change that the planet has not seen for a very long time. When we pull back and take a larger view of ethics, we may realize that the Earth is shifting under moral theory as well.

If there is any one theme that emerges from the Second Premise Project, it is that the Western world is undergoing a fundamental change in our answers to basic philosophical questions: What is the world? What is the place of humans in it? How, then, shall we live? We might once have thought that the Earth was created for our use alone and that it drew all its value from its usefulness to us, or that we had no obligations except to ourselves, as individuals or as a species. We might have thought that humans find their greatest flourishing as individuals in competition with one another. But ecological science and almost all the religions of the world renounce human exceptionalism as simply false and deeply dangerous. Rather, humans are part of intricate, delicately balanced systems of living and dying that have created a richness of life greater than the world has ever seen. Because we are part of the Earth's systems, we are utterly dependent on their thriving. As humans, we are created and defined by our relation to those great systems; we find our greatest flourishing in cultural and ecological community.

We should probably not be surprised that moral theories devised to fit the prior worldview are not serving us as well in the world that the ecologists describe.

WHAT WE NEED NEXT

However we come to justify claims about our moral obligation to avert the worst effects of the environmental emergencies, a number of ideas emerge from the testimony in *Moral Ground* to suggest the general shape of future moral arguments.

First, there is the matter of match between ontology and ethics. Philosophers work hard to be sure that moral theories are internally consistent, a minimal requirement for any system that might guide us. But the efficacy of theories depends also on external consistency. Just as Christian ethics gains its moral authority from religious worldviews, other ethics are necessarily linked to particular understandings of the human condition. *To the extent that* (an important caveat) an ecological explanation of the planet and the place of humankind in its systems gains traction, moral arguments in the future must be at least consistent with an ecological understanding of the interconnection of all being. It will not do to have a view of the world that is frankly ecological while holding moral views drawn from human exceptionalism. A sign of the times to come is the effort we see in the Second Premise Project arguments to re-cast moral reasoning (Christian, Buddhist, utilitarian, virtue-based, etc.) in ecological terms.

Second, even as they work within the common framework of ecological thinking, it seems likely that moral arguments about the responsibilities to avert the climate emergencies will be many and varied. One challenge of Western philosophy will be to find a way to make room in the moral world for dozens of reasons. Lawyers call this approach "parallel pleading": when their clients' lives turn on the efficacy of argument to shape the judgments of judges and juries, attorneys do not trust only one approach. They offer them all—as many appeals to law and precedent and justice as they can muster—on the principle that if one argument doesn't work, maybe another will.

> "...humans are part of intricate, delicately balanced systems of living and dying that have created a richness of life greater than the world has ever seen. Because we are part of the Earth's systems, we are utterly dependent on their thriving.

Or to put this differently (the reader will see parallel pleading at work here): The enormity of the crisis might well be better answered if philosophers shifted their understanding of their work, not to look for the one most defensible reason to act, but to find a way to embrace all the reasons. What the authors call the "dead-duck theory of truth"—whereby philosophers shoot at arguments until there's only one crippled and wing-shot bird left

standing—may be a way of working that we can no longer afford.

Third, the importance of a wide variety of moral approaches to climate change issues is underscored by sociologists' work on framing issues. It may or may not be the work of philosophers to change the world. But surely we can offer good ideas that might do that job. Persuasion, sociologists are increasingly convinced, is a matter of fitting an argument to the core values of the audience. Speak to Christians about the sacred and holy Earth. Speak to utilitarians about the future of their grandchildren. Speak to egoists about their legacy. To formulate a wide variety of arguments as carefully and as honorably as we can and to put them into the hands of change agents may be our most important work.

> "It will not do to have a view of the world that is frankly ecological while holding moral views drawn from human exceptionalism.

SOME INTERESTING AND PROMISING IDEAS

Among the hundred or so arguments that people of wisdom have sent us are many that have caught our attention especially, either because they seem to offer something new or because they seem to have particular power at this point in history. Acknowledging that in this setting we can offer only the barest sketches of the arguments, we excerpt and describe several of them here. None of them are new; in fact, some of them are already the subject of lively philosophical debate. What may be new about them is how urgently and poignantly they speak to current situations. What may be promising about them is how powerfully they call to Western moral philosophers to listen to (and to collaborate with) people outside their philosophical communities.

The right to culture. In speeches around the globe, Sheila Watt-Cloutier, former International Chair for the Inuit Circumpolar Council, makes the following argument:

> We Inuit live in four countries of Canada, Alaska, USA, Greenland and Russia. And we're about 155,000 Inuit in the entire world, at the top of the world, in the land of the cold, the ice and the snow. . . .
>
> Among the harms that we have suffered both in Canada and Alaska are the eroded landscape, the contaminated drinking water, the coastal losses because of erosion, the melting permafrost that is now causing beach slumping and increased snowfall in some areas, not enough snow in other areas, longer sea-ice-free seasons. New species of birds and fish and insects have arrived in the Arctic, which we don't even have names for half the time. There are unpredictable sea-ice conditions. Glaciers are melting, creating torrential rivers instead of streams, and now we have more drownings where our hunters thought they could cross safely. . . .It's becoming very stark, and it's becoming a real dangerous reality for many of us up there. And so, it is starting to undermine the ecosystem, of course, on the very land, the ice, and the snow that we depend for our own physical and cultural survival. . . .
>
> What we're saying to the governments is, you must develop your economies using appropriate technologies that limit the pollution, that limit the greenhouse gases that are at the root of what is happening in the Arctic and the melting of the glaciers and the ice and the snow. . .
>
> . . . in fact what we are doing here is we are defending our right to culture, our right to lands traditionally used and occupied, our right to health, our right to physical security, our right to our own means of subsistence and our rights to residence and movement. And as our culture, again, as I say, is based on the cold, the ice and snow, we are in essence defending our right to be cold.[2]

Here is important and potentially fruitful work for philosophers. How can we understand the right to culture? If there is a right to culture, does that imply a corresponding right to the ecological conditions necessary to the survival of that culture? Are we speaking of a peoples' right to culture, or of the rights of cultures themselves? Are they morally considerable? The insight that we think may be most important here, certainly worthy of serious thought, is the expansion of the sphere of moral concern beyond individual humans to the astonishing and (heretofore) lasting ways of life they have collectively created in particular places.

Responsibilities of gratitude. We were surprised to find that an argument from gratitude came to us from three very different places, an ethical convergence we never anticipated: from Robin Kimmerer, mycologist and member of the Citizens Band Potawatami tribe; from His Holiness, the Ecumenical Patriarch Bartholomew; and from Professor Courtney Campbell, a member of the Church of the Latter-day Saints. Although they differ in details, the argument is essentially this: The gifts of the Earth (what we cravenly call "natural resources" or "ecosystem services") are freely given—rain, sun, fresh air, rich soil, all the abundance that nourishes our lives and spirits. Perhaps they are given to us by God or the gods; maybe they are the fruits of a fecund Earth. It doesn't matter to the argument: let that be a mystery, why we are chosen to receive such amazing gifts. What is important is that they are given. We do not earn these gifts. We have no claim on them. If they were taken away, there is nothing we could do to get them back. At the same time, we are utterly dependent on these gifts. Without them, we quickly die. This unequal relationship, the relationship of giver and receiver of gifts, makes all the moral difference.

We understand the ethics of gift-giving. To receive a gift requires us to be grateful. To dishonor or disregard the gift—to ruin it, or waste it, or grind it into the ground, to turn it against the giver or lay greedy claim to it or sourly complain—all these violate our responsibilities as a recipient. Rather, to be grateful is to honor the gift in our words and our actions, to say, "This is a great gift," and to protect it and use it well. In this way, gratitude calls us to attentiveness, celebration, and careful use.

Furthermore, an important part of gratitude is reciprocity, the responsibility to give in return. We give in return when we use our gifts well for the benefit of the Earth and the inhabitants who depend on its generosity. In this way, gratitude for our abundant gifts is the root of our moral obligation to the future to avert the coming environmental calamities and leave a world as rich in possibilities as the world that has been given to us.

Responsibilities grounded in personal integrity. Bill McKibben bleakly states the challenge to moral thought: "The chance that we will in fact 'leave to the future a world as least as rich in possibilities as the world that was left to us' is nil. As in, not going to happen. We have effectively ended the Holocene, the ten thousand years of climatic stability that allowed human society to establish itself, and then to flourish."[3]

This is a problem. We have built a society fixated on the future, perpetually risking all the attendant problems of justifying means by their ends. We have therefore built a society that can be readily disempowered by hopelessness. The conviction that no matter what we do, we can't help but diminish and destabilize the planet, is an invitation to hopelessness and the wholesale abandonment of ethics. However, as Spinoza wrote, "lack of power consists only in this, that a man allows himself to be guided by things outside him, and to be determined by them." Because our virtue is the one thing that is within our control, we are invited by the bleak scenario to take virtue ethics very seriously. The Second Premise Project brought forth a number of richly provocative (and often inspiring) explorations of how a virtue ethic might guide us. Consider, for example, Dale Jamieson:

> My point is simple, if radical. I have suggested that climate change poses a fundamental challenge to how we think of our lives having meaning, and that respecting those who will follow is part of how we might constructively respond to this challenge. Such a response does not depend on sweeping views about rights, duties, and responsibilities, but only on modest views about what gives our lives meaning. What makes our lives worth living is the activities we engage in that are in accordance with our values, whatever happens in the world. If we live in this way, even if our cause isn't successful, we will have lived a life that is worthwhile because it will be a life that is authentically our own.[4]

As utilitarian and deontological moral reasoning get sort of wobbly around the knees in this most perfect of moral storms, virtue ethics might be a personal flotation device worth holding on to. Our environmental woes, a virtue-based argument might continue, are ultimately the result of not acting rightly as people of moral integrity. Instead, we are morally unthinking; we act selfishly, unwisely, and arrogantly; we fail to consider and enact an appropriately inclusive sense of moral responsibility; we lie to ourselves about the harms we cause and allow to be caused; we dumbly fail to fully account for the negative impacts of our actions

and our policies. Our hypocrisy is a wonder to behold. The thrust of this argument is not swayed or impacted by moral excuse-making. The prediction that acting in accordance with our values, acting as people of moral integrity, might not impact the world, help the future, or stop global climate change is irrelevant. Without an overt decision to be a person of moral integrity—to be a person who does what she or he believes is right—we will forever be unable to fulfill our obligations to one another and certainly to the future.

If this is so, then a virtue ethic may be a way to go forward, a way to find reason to act rightly, even in a time as dangerous as our own, and by that means to create a most lasting culture. The possibility is worth serious thought.

*Responsibilities that grow from love***.** What does it mean to love a place? We do fall in love with places, there is no doubt. The crest of a mountain, the childhood shelter behind the hedge, the rockwrack shore of the sea, the lilac in bloom by the bus stop—each of us has a place that makes us feel whole and happy and alive. Sometimes, we fall in love with the entirety of these, the global home so beautiful from space, with its glowing blue skin and soft clouds. Loving a place is a way of feeling connected and at peace. But loving is also a way of acting. Can we claim to love a place if we skim it for our own gain, or slash it and leave it to die? Just as in loving a person, loving a place means being kind to it, protecting it, caring about its well-being as much as your own.

That analogy is the basis of what has come to be called the "ecological ethic of care." Humans are born to love. When we are most fully blessed, we are born into loving relationships, with people and with places. We have treasured memories of caring and being cared for, of sheltering and being sheltered. Our moral responsibilities grow from those relationships. Just so, because we love the world are born to—a world now so deeply imperiled—we have a responsibility to come to its defense.

A CALL TO MORAL DISCOURSE

We call on universities, media, civic organizations, churches, neighborhoods to create the social spaces for a great national conversation about what the environmental emergencies ask of us as moral beings. In this perfect moral storm, we need to build a floating ark of ideas in response to the global challenge to the moral imagination—ideas expressed in all the languages of love, grief, prayer, philosophical analysis, and storms.

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NOTES

[1] For the purposes of the book, we group the arguments in fifteen categories based on the nature of the appeal. To honor the arguments in all their variety and uniqueness, we chose not to force them into the usual categories of utilitarian, deontological, etc., although readers can see how this might be done. The appeals are as follows:
In a time of climate change and other environmental calamities, do we have a moral obligation to the future to leave a world as rich in possibilities as the world we live in?

- Yes, because the survival of humankind depends on it.
- Yes, for the sake of the children.
- Yes, for the sake of the Earth itself.
- Yes, for the sake of the sparrows and seagrass, for newborn whales and tons of krill, for fish like confetti on coral reefs, for lignonberries and the paw-prints of bears, for each of these and all the others.
- Yes, because the gifts of the Earth are freely given, and we are called to gratitude and reciprocity.
- Yes, for the full expression of human virtue.
- Yes, because all flourishing is mutual.
- Yes, for the stewardship of God's creation.
- Yes, because compassion requires us to reduce or prevent suffering.
- Yes, because justice demands it.
- Yes, because the world is beautiful.
- Yes, because we love the world.
- Yes, to honor the rights of future generations of all species.
- Yes, for the honor and celebration of the Earth and Earth systems.
- Yes, because our moral integrity requires us to do what is right.

[2] S. Watt-Cloutier, speaking at "Indigenous Peoples' Resistance to Economic Globalization: A Celebration of Victories, Rights and Cultures," held by Democracy Now, November 23, 2006, New York, NY; transcript available at http://www.democracynow.org/2006/11/23/indigenous_peoples_resistance_to_economic_globalization.

[3] B. McKibben, "Something Braver Than Trying to Save the World." in K. Dean Moore and M.P. Nelson, eds., *Moral Ground: Ethical Action for a Planet in Peril* (San Antonio, TX: Trinity University Press, 2010), 174-77.

[4] D. Jamieson, "A Life Worth Living," in Moore and Nelson, eds., *Moral Ground*, 183-88.

Leopold's Evolving Legacy: Key Trends in Conservation Ideas, Science, and Practice

By CURT MEINE

In his influential essay "The Land Ethic," completed in the final year of his life, Aldo Leopold summarized the lessons he had learned across four decades as a conservation scientist, advocate, practitioner, and teacher. Leopold argued that the next phase of human ethical development must include expanding our sphere of moral concern to encompass the land. Only through such an expanded ethic, he held, could human and natural communities, in all their diversity, productivity, and beauty, function well and thrive together over the long run. "I do not imply that this philosophy of land was always clear to me," Leopold admitted. "It is rather the end-result of a life-journey, in the course of which I have felt sorrow, anger, puzzlement or confusion over the inability of conservation to halt the juggernaut of land abuse."[1]

In 1988 I traced that "life journey" in a biography, *Aldo Leopold: His Life and Work*. One did not have to be especially prophetic to see that Leopold's legacy would not only remain relevant to conservation, but would continue to evolve in important new ways. Leopold's passion for wild places, for vibrant human landscapes and communities, for sound economies rooted in ecological realities, and for adventure and exploration crossed the sensitive fault lines of modern environmentalism and political ideology. Leopold anticipated our attention to global-scale human impacts on what he called "the land"—the soil, water, atmosphere, oceans, plants, animals, and people—even while being focused on the local and particular. He had useful and incisive things to say about many urgent, specific concerns (such as watershed function or the ecological function of fire), about great themes (such as the broad history of human-land interactions), and about the connections among them. Devoted to positive and progressive reform, he was also a pragmatist with deep understanding of human dilemmas and the impediments to change. In the heyday of an environmental movement and an emerging anti-environmental backlash—both often in the news, but usually lacking in historical perspective—I found Leopold's story to be powerfully *grounded* and *grounding*. It provided connections across generations, perspectives, and landscapes. It exposed forgotten foundations and offered continuity amid complexity.

In examining Leopold's life and work, I had the advantage of building upon decades of environmental scholarship, commentary, and criticism. In the decades following Leopold's passing in 1948, a generation of writers—including such voices as Lewis Mumford, Joseph Wood Krutch, Rachel Carson, Wallace Stegner, Peter Matthiessen, Sigurd Olson, Wendell Berry, Gary Snyder, N. Scott Momaday, Edward Abbey, and Annie Dillard—had risen up to speak for and from the American land. They gathered the "cultural harvest" from the land that Leopold had anticipated.[2]

Moreover, whole new fields of study were emerging to inform the task. In the sciences, the boundaries of established disciplines and natural resource management specialties (forestry, fisheries and wildlife

management, range management, etc.) dimmed as new and more integrated fields gained ground: conservation biology, restoration ecology, sustainable agriculture, landscape ecology, and ecological economics.[3] Social scientists began to examine in new ways the intimate connections among culture, communities, economies, and the natural world. Environmental ethics, environmental history, and a burgeoning literature of *place* started to explore the vital spaces between traditional academic domains.

Scientists, scholars, writers, and conservation practitioners in all these fields recognize a kinship with Aldo Leopold. Leopold was one who understood, on both practical and theoretical grounds, the hazards of rigid disciplinary thinking. "All the sciences and arts are taught as if they were separate," he once wrote. "They are separate only in the classroom. Step out on the campus and they are immediately fused. Land ecology is putting the sciences and arts together for the purpose of understanding our environment."[4] That boldness in fusing fields of knowledge was characteristic of Leopold. Increasingly we appreciate how necessary this is, not only to enrich our understanding, but to solve our problems, sustain our economies, fulfill our responsibilities, express our hopes, and deepen our joys.

By striving, as he memorably put it, to "think like a mountain," Leopold altered the course of conservation history. We can see his continuing influence in the trends that have reshaped conservation thought, science, policy, and practice since the biography was first published:

Dynamic ecology and landscape change. Among ecologists the notion of a stable and static natural world tending toward a state of perpetual balance has faded, replaced by a view that emphasizes patterns of change, flux, and resilience in ecosystems. As early as the 1920s Leopold explicitly rejected simplistic notions of the "balance of nature," based especially on his growing understanding of landscape history and the dynamics of wildlife populations. Through the chaotic environmental conditions of the 1930s Leopold developed an ever-deeper appreciation of the intricate functioning of biotic communities and of what he began to call "land health." Change, at all scales of time and space, was basic to Leopold's emerging ecological worldview.[5]

Biodiversity and conservation biology. These terms had not yet been coined in Leopold's day. His work prepared the way for their emergence and adoption in the mid-1980s. A growing recognition of the value of biological diversity runs like a bright line across Leopold's career. It transformed his definition of conservation from one based on the Progressive Era's quantitative standards of economic efficiency and sustained yield to one based on the quality of entire, healthy, functioning landscapes and communities, with special emphasis on the maintenance of biological diversity. As the field of conservation biology came together to help guide this new approach, Leopold has come to be recognized as one of its early exemplars.[6]

The critique of wilderness. Since the 1980s biologists, historians, philosophers, geographers, and others have strongly challenged, on various grounds, long-established ideas about the definition, nature, and value of wilderness. Lively debates have focused especially on the definition of wilderness as pristine space, separate (and *separable*) from historical, cultural, and ecological realities. Amid the smoke, there has been some cleansing flame. This critique has yielded a more subtle understanding of the social, cultural, environmental, and political context of wilderness; of the evolving role of native peoples worldwide in shaping landscapes and ecosystems over the millennia; of the varied values associated with wildlands at all scales; and of the role of protected areas as a conservation strategy. It has also called into question one of Leopold's core concerns as a conservationist. Leopold has long been recognized as one of America's foremost champions of "wild things" and wild places. The postmodern critique of wilderness has brought more careful scrutiny of the evolution in Leopold's wilderness ideas and advocacy, highlighting especially his integration of wilderness within a comprehensive conservation vision.[7]

> "Leopold's passion for wild places, for vibrant human landscapes and communities, for sound economies rooted in ecological realities, and for adventure and exploration crossed the sensitive fault lines of modern environmentalism and political ideology.

Landscape-scale approaches. Natural resource managers—including foresters, fish and wildlife managers, range managers, soil and water conservationists, civil engineers, and urban and land use planners—no longer have the luxury of thinking of themselves in isolation from one another. They work within the same landscapes, watersheds, and communities. Their lines of activity invariably intersect, and the state of the land testifies to their ability—or failure—to work together. Leopold strove to communicate this theme through his entire conservation career. In the last twenty years, this perspective has gained ground through the science of landscape ecology (among other interdisciplinary fields) and in the adoption of ecosystem management as a unifying approach within the various natural resource professions. It has also served to bind conservation efforts together across the landscape, from our wild and rural lands to our suburbs and cities, and including our shared oceans and atmosphere.[8]

> The intimate connections among land, food, health, security, and community have now come into focus again. They will continue to reshape conservation and agriculture into the indefinite future.

Private land conservation. "The thing to be prevented," Leopold wrote in 1934, "is destructive private land-use of any and all kinds. The thing to be encouraged is the use of private land in such a way as to combine the public and private interest to the greatest possible degree."[9] Through the 1960s and 1970s the environmental movement focused strongly on issues involving public lands, while neglecting the challenge of private land conservation. Over the last two decades that has changed. Around the country conservationists have fostered "smart growth" programs, a robust land trust movement, and other efforts to protect and restore "working" farms, rangelands, and forests. In 1996 the USDA's Soil Conservation Service was rechristened the Natural Resource Conservation Service, with a strengthened mandate to help the nation's private landowners in becoming better land stewards.[10] The challenge of conserving private land is plainly monumental and sobering; nonetheless, the reclaiming of this aspect of conservation history has been one of the key achievements of the last several decades.

Food, agriculture, and conservation. Closely tied to the theme of private land conservation is the surge of interest in organic, sustainable, and local (including urban) food production. Many of the forces driving the dominant industrial agricultural model first gained traction in the years following World War II, as war-spawned technologies, demographic trends, economic incentives, and government programs changed the face of farming and ranching.[11] Leopold lived just long enough to see the impact of those gathering forces. He warned in 1945 that the "tremendous momentum of industrialization" on the farm, left unchecked, would "[generate] new insecurities, economic and ecological, in place of those it was meant to abolish. In its extreme form, it is humanly desolate and economically unstable."[12] The intimate connections among land, food, health, security, and community have now come into focus again. They will continue to reshape conservation and agriculture into the indefinite future.

Ecological restoration. In his introduction to *A Sand County Almanac*, Leopold stated, "On this sand farm in Wisconsin, first worn out and then abandoned by our bigger-and-better society, we try to rebuild, with shovel and axe, what we are losing elsewhere."[13]

> Leopold remains a unique link between Progressive-era conservation, modern environmentalism, and the still-emerging successor to these movements.

It was the most personal of Leopold's career-long efforts to restore natural things: game and wildlife populations, watersheds, forests and rangelands, prairies and wetlands, diversity and beauty, ecosystem function and land health. Beginning in the 1934, Leopold and colleagues at the University of Wisconsin Arboretum in Madison pioneered a new dimension of conservation: ecological restoration. Especially since the 1970s, the science and practice of restoration have spread to institutions, agencies, and ecosystems worldwide, providing conservationists with a broader range of tools and an active complement to the preservation and sustainable use of land.

Ecosystem services. Even by his own standards, Leopold could be especially succinct on the theme of economics: "We fancy that industry supports us, for-

getting what supports industry."[14] Since the 1980s creative economists and conservationists have together explored new methods of assessing natural assets, emphasizing especially the value of such ecological "services" as carbon sequestration, pollination, freshwater filtering, flood protection, and pest control. Long ignored by traditional schools of economics, these values are now at least part of the discussion, and the idea has moved from the realm of abstract concept to real-world policy-making.

Community-based conservation. As a young ranger in the early U.S. Forest Service, Aldo Leopold personified the top-down approach of the Progressive conservation movement. Over his career, however, as he wrestled with such geographically extensive challenges as soil erosion, watershed rehabilitation, and wildlife restoration, he pioneered new ways of involving local landowners and other citizens in their home landscapes. Over the last several decades this same need to work from the bottom up has inspired work through a tremendously diverse array of local conservation organizations. This trend is evident not only in the United States but in conservation programs around the world.[15]

The greening of religion and philosophy. In "The Land Ethic" Leopold observed ruefully that "No important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections, and convictions. The proof that conservation has not yet touched these foundations of conduct lies in the fact that philosophy and religion have not yet heard of it."[16] It is no longer unusual for philosophers, ethicists, and theologians to address the moral and ethical dimensions of our environmental challenges and human-nature relationships. The last two decades have been a time of vibrant scholarship and reflection, as students within a wide array of faith communities and philosophical schools have reexamined the ecological insights of their traditions. Philosophy and religion have now "heard of" conservation, while many conservationists have come to listen differently to the language of belief and philosophical inquiry.[17]

Environmental justice. The face of conservation in Leopold's day was largely white, male, and rural, with its strongest base of support among sportsmen, farmers, and foresters. The face of environmentalism was largely dominated by urban and suburban baby-boomers, and was especially attentive to outdoor recreation and environmental quality issues. Entire segments of American society and culture were underserved and underrepresented in the conservation arena until a new wave of advocates unfurled the banner of environmental justice beginning in the early 1990s. Aldo Leopold spoke or wrote explicitly on matters of race, class, gender, and ethnicity only infrequently (despite the fact that his wife Estella was Hispanic by background). However, Leopold's call for a durable ethic of "love and respect" for land as a community resonates increasingly among those working to build a more inclusive conservation movement, as well as those seeking to understand the historical roots of environmental justice issues.[18]

Sustainability and resilience. Since the 1980s, *sustainability*—however awkward the term—has served to bind together the many intersecting social and environmental issues of our day, from climate change, energy, and biodiversity loss to population growth, global poverty, and public health. The term is, in a sense, a proxy. We needed a word to convey the idea of connection in the world among multiple needs and concerns. It indicates that we are still striving, as Leopold did, to "[put] the sciences and arts together for the purpose of understanding our environment." And *resilience* has come to signify our commitment to making those connections healthier. It in fact adheres very closely to Leopold's definition of land health as "a state of vigorous self-renewal" within our comingled human and natural communities.[19]

"Philosophy and religion have now "heard of" conservation, while many conservationists have come to listen differently to the language of belief and philosophical inquiry.

These many trends have been converging in ways that are fundamentally reconfiguring traditional conservation and environmentalism. For some, this is a long-unfulfilled hope and a long-overdue need, especially in the face of mounting environmental woes. For others, these changes may be vaguely threatening—as, in fact, they are to any simple notion of what conservation was, is, and will become. Aldo Leopold's story shows that, in reality, many of these trends have deep historical roots whose shoots are only now greening up. "Conservation," Leopold

wrote in 1940, "viewed in its entirety, is the slow and laborious unfolding of a new relationship between people and land."[20] That new relationship is far from being fully developed. But it continues, vigorously, to unfold.

Leopold remains a unique link between Progressive-era conservation, modern environmentalism, and the still-emerging successor to these movements. This suggests another theme: Leopold's lifelong search for common ground in conservation. In Leopold's time as in ours, the forces of self-interest, parochialism, specialization, and crass materialism served to divvy up the land and its values, to pit one generation against the next, to distract us tragically from shared commitment to the common good. In a 1939 article, "The Farmer as a Conservationist," Leopold pithily skewered the attitude that had brought on the Depression and the Dust Bowl. Of his times Leopold wrote, "Everybody worried about getting his share; nobody worried about doing his bit." History, it seems, has brought us around the circle once more.

The quest to build a more durable and self-renewing relationship between people and land is the paramount challenge for this generation, and for as many generations as we care to look into the future. That challenge contains within it the other, multiple challenges we face involving energy, climate, the oceans, biodiversity, water, food, human health, and the creation of a healthful economy. With his distinctive mix of pragmatism and idealism, Leopold recognized that "We shall never achieve harmony with land, any more than we shall achieve absolute justice or liberty for people. In these higher aspirations the important thing is not to achieve, but to strive."[21] Aldo Leopold's is a human story, of one who strove. By knowing his story, we can see deeper into conservation's story. By knowing conservation's story, we gird ourselves for the work ahead.

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NOTES

1. A. Leopold, "Foreword" (unpublished foreword to *A Sand County Almanac*), in *Companion to A Sand County Almanac*, ed. J. Baird Callicott (Madison: University of Wisconsin Press, 1987), 282.

2. A. Leopold, *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, 1949), ix.

3. See R.L. Knight and S.F. Bates, *A New Century for Natural Resources Management* (Washington, DC: Island Press, 1995); B.A. Minteer and R.E. Manning, *Reconstructing Conservation: Finding Common Ground* (Washington, DC: Island Press, 2003); and R.L. Knight and C. White, *Conservation for a New Generation: Redefining Natural Resources Management* (Washington, DC: Island Press, 2009).

4. A. Leopold, "The Role of Wildlife in a Liberal Education," *Transactions of the Seventh North American Wildlife Conference* (Washington, DC: American Wildlife Institute, 1942).

5. For a critical assessment of this theme in Leopold's work, see J. Baird Callicott, "Do Deconstructive Ecology and Sociobiology Undermine Leopold's Land Ethic?" *Environmental Ethics* 18, no. 4 (1996): 353-72; and J. Baird Callicott, "From the Balance of Nature to the Flux of Nature: The Land Ethic in a Time of Change," in *Aldo Leopold and the Ecological Conscience*, ed. R.L. Knight and S. Reidel (New York: Oxford University Press, 2002), 90-105.

6. See R. Noss, "Aldo Leopold Was a Conservation Biologist," in *Aldo Leopold and the Ecological Conscience*, ed. Knight and Reidel, 105-117; C. Meine, *Correction Lines: Essays on Land, Leopold, and Conservation* (Washington, DC: Island Press, 2004), 117-31; C. Meine, M. Soulé, and R. Noss, "'A Mission-Driven Discipline': The Growth of Conservation Biology," *Conservation Biology* 20, no. 3 (June 2006): 631-51.

7. Many of the core historical and contemporary commentaries on wilderness have been gathered in two collections: J. Baird Callicott and M.P. Nelson, eds., *The Great New Wilderness Debate* (Athens: University of Georgia Press, 1998); and M.P. Nelson and J. Baird Callicott, eds., *The Wilderness Debate Rages On: Continuing the Great New Wilderness Debate* (Athens: University of Georgia Press, 2008). See also Meine, *Correction Lines,* 89-116.

8. Landscape ecology and its conservation implications are explored in R.L. Knight and P.B. Landres, eds., *Stewardship Across Boundaries* (Washington, DC: Island Press, 1998); M.G. Turner, R.H. Gardner, and R.V. O'Neill, *Landscape Ecology in Theory and Practice: Pattern and Process* (New York: Springer, 2001); and K.J. Gutzwiler, ed., *Applying Landscape Ecology in Biological Conservation* (New York: Springer-Verlag, 2002).

9. A. Leopold, "Conservation Economics," *Journal of Forestry* 32, no. 5 (1934): 542.

10. See *America's Private Land: A Geography of Hope* (Washington, DC: USDA Natural Resources Conservation Service, 1996).

11. A concise history of sustainable agriculture can be found in R.S. Beeman and J.A. Pritchard, *A Green and Permanent Land: Ecology and Agriculture in the Twentieth Century* (Lawrence: University Press of Kansas, 2001).

12. A. Leopold, "The Outlook for Farm Wildlife," *Transactions of the Tenth North American Wildlife Conference* (Washington, DC: American Wildlife Institute, 1945), 168.

13. Leopold, *A Sand County Almanac*, viii.

14. Ibid., 178.

15. A rich literature of community-based conservation has developed over the last two decades. A sampling includes: D. Western and M.C. Pearl, eds., *Conservation for the Twenty-First Century* (New York: Oxford University Press, 1989); R.M. Wright, D. Western, and S.C. Strum, eds., *Natural Connections: Perspectives on Community-Based Conservation* (Washington, DC: Island Press, 1994); W. Vitek and W. Jackson, eds., *Rooted in the Land: Essays on Community and Place* (New Haven, CT: Yale University Press, 1996); T. Bernard and J. Young, *The Ecology of Hope: Communities Collaborate for Sustainability* (Gabriola Island, BC, Canada: New Society Publishers, 1997); G.K. Meffe, L.A. Nielsen, R.L. Knight, and D.A. Schenborn, *Ecosystem Management: Adaptive, Community-Based Conservation* (Washington, DC: Island Press, 2002); Minteer and Manning, *Reconstructing Conservation*; R.L. Knight and C. White, *Conservation for a New Generation: Redefining Natural Resources Management* (Washington, DC: Island Press, 2008); and P. Hawken, *Blessed Unrest: How the Largest Movement in the World Came into Being and Why No One Saw It Coming* (New York: Viking Press, 2007).

16. Leopold, *A Sand County Almanac*, 209-210.

17. I am especially grateful to my friends and mentors Gretchen Schoff, Baird Callicott, Cal DeWitt, and Ron Engel for helping me to understand more fully the nature of these transformations. Particularly useful contributions in this work include the ten-volume World Religions and Ecology Series (published between 1997 and 2004 by Harvard University Press); the related work of the Forum on Religion and Ecology (FORE), led by Mary Evelyn Tucker and John Grim; and B. Taylor and J. Kaplan, eds., *Encyclopedia of Religion and Nature* (London, UK: Continuum International Publishing Group, 2005).

18. See W. Berry, *The Hidden Wound* (Boston, MA: Houghton Mifflin, 1970); P.S. Wenz, *Environmental Justice* (New York: SUNY Press, 1988); R.D. Bullard, ed., *Unequal Protection: Environmental Justice and Communities of Color* (San Francisco, CA: Sierra Club Books, 1994); A.H. Deming and L.E. Savoy, eds., *The Colors of Nature: Culture, Identity, and the Natural World* (Minneapolis, MN: Milkweed Editions, 2002); C. Merchant, "Shades of Darkness: Race and Environmental History," *Environmental History* 8, no. 3 (July 2003): 380-94; and S. Hood Washington, *Packing Them In: An Archeology of Environmental Racism in Chicago, 1865–1954* (Lanham, MD: Lexington Books, 2005).

19. Meine, *Correction Lines*, 63-85. Also see p. 465 of this volume,

20. A. Leopold, "Wisconsin Wildlife Chronology," *Wisconsin Conservation Bulletin* 5, no. 11 (1940): 6.

21. L.B. Leopold, ed., *Round River: From the Journals of Aldo Leopold* (New York: Oxford University Press, 1953), 55.

Toward a Deeper Bioethics

By PETER WHITEHOUSE

INTRODUCTION

Relationships and stories are essential to the human condition—people and ideas relate to each other, and narrativizing these relationships can create "true" myths important for human survival. The topic is personal—my relationships with four environmental thinkers and activists, and with metaphors of earth-changing proportions. Aldo Leopold, Van Rensselaer Potter, Arne Naess, and Rachel Carson inspired me to not only "think like a mountain" and then to embrace my feminine side and "feel like water," but to act boldly in the real world. As courageous scientist-scholars they enriched my mind, and as human beings they strengthened my heart.

The stories involve seeking out academic and real-life dominant words and stories, exploring their impacts and values as they facilitate or distort our journeys through time as we examine the mysteries of ourselves and our multiple cultural worlds. The characters are larger-than-life spirits that meet on the peaks of inspiring mountains and on the shores of vast bodies of turbulent seas. Their stories plumb the depths of our humanity and of our ignorance. Ultimately, they demonstrate the quest for wisdom in community and how personal death can reflect a life well lived.

Our real world of human living and meaning is more about relationship and process than structure and content, and more about culture than physics. Drawing connections amongst divergent sources is a mechanism of creativity and generativity. Our understanding of words as they relate to each other in stories is more important for our existence than knowing how atoms bind together in molecules or how stars are formed. Changing the story can help create a viable future, and such transformation can be just as powerful as the havoc wreaked on the physical environment by the industrial age that now threatens coming generations.

As a physician, cognitive scientist, and reformed bioethicist (see below), I have focused my academic career on the cognitive challenges of brain aging, and increasingly of late, on intergenerational education and sustainability. My life goal is to help to create learning environments that foster collective wisdom, promote healthy living, and grow spirited citizens to serve a viable future.

I practice in an academic hospital in the city of Cleveland—a city that is linking its future to health care and a green economy. Health care systems should be healthy, caring, and patient-oriented (person-oriented), but they are not, especially in the United States. Educational systems should be imbued with the passion for learning and student-oriented, but they only profess to be so. Health is a mirror of a culture's material and spiritual well-being; teaching youngsters (and adults) is our hope for the future. Sickness in individuals and organizations comes from being out of balance internally and in relation to the external world. Ill health creates dis-ease and threatens an organism's

ability to thrive and survive. Learning is the major way to promote better health. Our health and educational enterprises are neither successful nor sustainable. They are poor value for money in terms of enhancing quality of life though disease prevention and amelioration and educating innovative and committed citizens. Their failures to even define health or a well-educated person adequately reflect why the human species is endangered.

> Sickness in individuals and organizations comes from being out of balance internally and in relation to the external world.

In an era of global climate change, how can health and learning systems become drivers toward a viable future instead of contributing to our distraction and demise? How can we prioritize our research, our clinical care, and our educational goals to promote an integrative model of health, rather than pursue the fantasies of unlimited growth and death avoidance? To me the first step is in principle quite simple: stories and images (multimedia narratives) must be constructed to draw us into a more realistic appreciation of the present and an optimistic view of the future. What is complex is how we construct and disseminate these powerful, life-affirming narratives. For this endeavor we must look to past connections between people and ideas that inspire us and give us hope. We can then take these historical tales and myths, integrate them in the context of modern culture and information technology, and build new processes and organizations that encourage change. It takes courage and risks. And it will take a world willing and able to create and support opportunities for more people—especially those who currently live in fear and poverty—to demonstrate such fearlessness. Simply maintaining the status quo is itself a risk—indeed perhaps the greatest risk, since it leads to unsustainable population growth and certain further environmental degradation.

This essay turns now to the relationships I had and have with Aldo Leopold, Van Rensselaer Potter, Arne Naess, and Rachel Carson and their ideas. Such relationships illustrate powerful cultural processes alive in the world that offer hope for the future. I then focus on the application of these concepts and values in The Intergenerational School, a public charter school in Cleveland committed to spirited, lifelong learning and sustainable multi-age conversations about the future of our communities and the planet. I end with some more abstract reflections of the commonalities and differences among my four ecologically inspiring mentors and implications for action in the world.

RELATIONSHIPS—ONLY CONNECT

The story of my relationships with my four environmental heroes begins with a journey into the rapidly evolving field (soon discipline and then profession) of bioethics. As one who worked within the medical industrial complex to find effective biological treatments for what I used think was a medically targetable entity called Alzheimer's disease, I began to be concerned about the values underlying this academic endeavor and how its quest for a cure was driven by fame and fortune. I came to see the Alzheimer's field as a caricature of medicine's general addiction to a biotechnological imperative pushed forward by scientism and capitalism. I studied issues like genetic testing, informed consent, conflict of interest, and end-of-life care. I saw money driving the field, and medicine ignoring the major threats to health. Looking for an alternative perspective, I earned a Master's degree in Bioethics, but also became concerned about the field's limited moral scope and moral imagination. Some of my teachers suggested I should learn about the man who invented the word "bioethics," and that is how my story of reformation begins. In the beginning was that word.

In 1970 Van Rensselaer Potter, inspired by Aldo Leopold's conception of land ethics, coined the term "bioethics." In his first book, *Bioethics: A Bridge to the Future*, Potter described this new field of study and action as located in the boundaries between biology and the humanities.[1] He titled his second book *Global Bioethics, Building on the Leopold Legacy*.[2] In later work I did with him, Potter and I extended the concept of global bioethics to deep bioethics, drawing on the inspiration of the deep ecologist and Norwegian philosopher, Arne Naess. Naess had adopted Leopold's expression that human beings need to learn to "think like a mountain" as a metaphor for long-term, aspiring, broad-based ecological thinking for his deep ecology movement. Leopold had coined this phrase in recalling the death of a wolf that he had shot and wondering how a mountain might think about the long-term impacts of predators on deer populations (about which Leopold changed his own views during

his career). Leopold, Potter, and Naess all had grave concerns about the future and saw value discussions as important to influencing our fate as a species.

Although they overlapped on the faculty at the University of Wisconsin in Madison, Potter and Leopold never met one another. Leopold was killed in a fire the year before I was born. Leopold inspired me through his writing and his influence on Potter. In addition, I was fortunate to befriend Leopold's biographer, Curt Meine, and to read his own inspiring work on conservation. I also attended several conferences focused on the Leopold legacy held in places where Leopold had lived and made his contributions. Curt's original scholarship also gave me the knowledge that beauty was a late editing addition to Leopold's now famous definition of something being ethical—i.e., anything that preserves the integrity, stability, and beauty of a biotic community. In a handwritten insert the word "beauty" was added to an otherwise typed text and the word "aesthetically" added to the word "ethically." As a scholar and as an ethicist, I had been much concerned about truth, but as a photographer looking for the "perfect" image to "capture" nature, I needed to understand and appreciate beauty and why scholars and ethicists tended to ignore this third path of Western philosophical thinking.

Potter at his writing hut and retreat in the woods.

The first time I met Van he picked me up at the airport in his rusting 1984 Subaru with the license plate "YES ZPG" and wearing his farmer's cap and scruffy clothes. Yet Potter was a PhD oncologist and member of the National Academy of Sciences who came to fully develop his ethical thinking only late in his career. His work in basic biochemistry of tumors led him to see the dangers of excess growth and the complexities of efforts to understand and intervene in biological systems. I spent several years collaborating with Van and conducting an extensive oral history. He was a genuine scientist who searched for the beauty in nature through knowledge. I was honored to give an address at his memorial service after he died in 2001.[3] For several years afterward I tried unsuccessfully to get the University of Wisconsin to recognize the power of linking their existing commitment to the Leopold Legacy to Van's contribution in health ethics.[4]

Potter never met Naess. I met him on two occasions, but only late in his career when he was limited by dementia. On the first visit I arranged a lunch on a mountainside overlooking Oslo, where he had been the youngest philosophy professor ever at the University of Oslo. He had developed the idea of deep ecology to focus on our spiritual connections to nature and to be critical of those "shallow" ecologists who only looked at the more scientific, practical, and superficial aspects of ecosystems. He could still wax eloquently and passionately about his work on the meaning of words and of the importance of every person developing a personal philosophy. His own "green" belief system, Ecosophy T (meaning "nature wisdom"), was named after the mountain upon which he build his hut to retreat from the world. Potter also had his own guiding philosophy expressed in a dozen or so statements that he included prominently in both his books. Arne was actually a mountaineer and famous for his exploits of one kind or another (like climbing up the outside of an academic building). Despite being demented, he inspired me and continued to be a national hero as his deep ecological ideas reflected the Norwegian sense of connectedness to nature. As a neurologist, I was a bit perplexed by the patchy nature of his cognitive impairment. His long-term memory and language were as expected more preserved than his short-term memory, but his wife said he could not even tie his own shoe laces, unusual for that degree of language preservation. By my second visit he was as expected looking more frail but still able to express his passion for nature. He illustrates for me the continuum of cognitive challenges and how persons with dementia can still play an important role in the lives of

others. Arne did in mine. Remarkable people remain remarkable even when affected by cognitive losses.

Interestingly, like Naess, Leopold and Potter both had a hut or shack located away from the city where they could commune deeply with nature and write. Each was acutely concerned about words and the capacities—and limitations—of the human mind. Each had a poet's heart as well as a scholar's intellect.

After being imbued by the spirit of these male heroic figures, I found my fascination with mountain climbing and photography expanding. In an effort to inspire myself and others I probed deeper in the landscapes of the mind. Clearly the long-term view built into the metaphor of "thinking like a mountain" is even more necessary today as the pace of global climate change and "weather weirding" accelerate (the latter is my term; some use climate weirding, first coined by Amory Lovins, to highlight abnormal and disturbing variations in climate systems, but I think bringing the focus to weather connects better to people's day-to-day and month-to-month appreciation that our local weathers are becoming stranger and more disruptive). Before my last visit with Arne I took a boat up the west coast of Norway and felt the strong presence of the increasingly ice-covered mountains as we traveled north beyond the Arctic Circle. Perhaps my deepest (and highest and most effortful) mountain experience was in the Himalayas of Nepal. Walking very slowly, feeling every breath at 17,000 feet while listening to my Sherpa guide tell me the name and height of every peak we passed, I realized that mountains did not worry about their names or even whether the range was separable into different peaks and certainly did not engage in a competition about how high they were!

Inspired by Arne's deep ecology, Van and I wrote our only paper together and invented the term "deep bioethics" to build upon his notion of global bioethics.[5] Van was frequently inventing new words to modify bioethics, so I also joined in that game. As Warren Reich pointed out, "global" meant both planetary in scope and intellectually all-encompassing. I suggested adding "deep" to mean looking into the core of the sphere of human thought and action by engaging with passion and spirit our relationships to nature. Frankly, it was also a dig at mainstream bioethicists, who seemed most eager to converse narrowly about a variety of genetic and medical research issues, but rarely took on the major world health issues or the power of medicine and its commodification.

FEELING LIKE WATER

Perhaps it was Arne's telling me about how he would stay in the water for hours feeling the sea creatures around his toes, or learning of Potter's community work with the Lake Monona conference center in Madison, or seeing the power of snow and ice in the Himalayas, but I eventually began to retell my own life story as a scientist/photographer starting in college studying the estuarine ecology of the Chesapeake Bay. I also explored the biology and behavior of thirst in animal models for my undergraduate psychology thesis. I was re-narrating my career as a clinical neuroscientist, trying to understand how people think and value natural systems.

Water became the force to balance the power of mountains. Given enough time, water can wear down any mountain. Water is essential to life. It is often associated with a more feminine energy as in the environment of the womb or the monthly flow of lunar tides. I tend to eschew dichotomous thinking like polar opposites such as masculinity and femininity; I see such dialectics more in an Eastern Yin and Yang fashion. However, the feminine side of all of us needs more voice in the world. I was then drawn to the work of Rachel Carson and to her haunts along the coast of Maine. Her books *Silent Spring*, *The Sea Around Us*, and *Sense of Wonder* inspired me with the same passion that my three masculine eco-ethicist figures had.[6] The idea that water can take on many forms (gas, liquid, and solid) in many different contexts (clouds, seas, lakes, rivers, and brooks) allowed me to create the metaphor of "feel like water" to complement "think like a mountain." Water can be steamy, misty, flowing, rigid—words that to me evoked emotion. Just as water can overpower mountain, I came to realize that if we are to change our course as a species we must link back into our animal, emotional side in a healthy manner and not pretend that we are above nature and can think our way out of every complex dilemma we find ourselves in. Perhaps the reawakening

> "In an era of global climate change, how can health and learning systems become drivers toward a viable future instead of contributing to our distraction and demise?

of the feminine in the world is a large-scale cultural response of our species to our current plight, which was created in large part, one might suggest, by masculine "control and conquer" forms of thought and action.

BACK TO SCHOOL

So I and many others have been inspired and enriched by these great and courageous people. But how do we change inspiration to aspiration and then act in the world? Over the last ten years I have focused on publishing a series of books deconstructing my career as a neurologist and neuroscientist. I then co-founded a public charter school with my wife Cathy and am currently moving my health practice into it. But to go back to the initiation of my academic career, one beginning was in a brain nucleus, once called mysteriously the "substantia innominata." Few people knew of its existence prior to our work at Johns Hopkins. For a brief moment in time, I was arguably the world's expert on a single brain nucleus. I recommend such a career strategy to all my mentees! In truth, however, I was lucky in my research. This nucleus is now known as the cholinergic basal forebrain and is one of the key brain structures affected in aging, Alzheimer's disease, and other related conditions. Cholinergic drugs are now the mainstay of our rather ineffective pharmacopeia for dementia.

> "Perhaps the reawakening of the feminine in the world is a large-scale cultural response of our species to our current plight, which was created in large part, one might suggest, by masculine "control and conquer" forms of thought and action.

Over the last quarter century, I have studied and cared for people affected by so-called Alzheimer's disease. My main emphasis in these years was basic biological research studying autopsy specimens that had been generously donated by family members and trying to develop drugs to improve the quality of life of people affected by those conditions based on an understanding of the biology. I became a well-known Alzheimer expert when I wrote or edited a series of books challenging the dominant story of the disease.[7] The most provocative was entitled *The Myth of Alzheimer's: What You Aren't Being Told about Today's Most Dreaded Diagnosis*.[8] This book retold the story of Alzheimer's suggesting that the dominant model (which I in fact helped to develop) was quite misguided. Alzheimer's disease is not one condition, and it is related to aging despite common assertions to the contrary. It is a very heterogeneous condition at genetic, pathological, and clinical levels of description. Despite billions of dollars of research, we have no effective ways of telling Alzheimer's from severe brain aging on the continuum of normal aging, nor do we have effective biological treatments. Although we have had many claims of breakthroughs over the years and assertions that we are close to the cure, we are not. If Alzheimer's is in fact a variety of age-related biological processes, then a cure is not likely, and new approaches to what is genuinely a tremendous individual, family, and social challenge need to be developed.

Embedded in this story is recognition of the power of words, especially when they are fear-provoking medical diagnoses like Alzheimer's disease, and how cultural stories limit individual choices about aging processes. I turned my attention to concepts like brain health, brain fitness, and positive aging. I came to recognize that as one—and perhaps the major—organ of learning, the brain inspires a more comprehensive program of disease prevention that focuses in part on building healthier learning organizations. We should not ignore, however, that we really learn with our entire body and often with other brains and bodies in social contexts.

Ten years ago my wife and I started The Intergenerational School[9] as a charter school in Cleveland, Ohio. The idea was to create an elementary school in which children from challenging urban environments could be offered, and share, learning experiences with young adults and elders. This community of excellence has demonstrated quantitatively and qualitatively its value for both children and for elders with memory problems. It has achieved local, regional, national, and international attention for its ability to improve public education while also offering opportunities for older adults to maintain their sense of purpose and engagement in community, even if challenged by dementia.

Since its beginning, the school has had a green consciousness and a commitment to sustainability. After all, sustainability is ultimately an intergenerational ethical issue. How do we use resources in the present so that future generations can also have opportunities to thrive? Since the start, we have had in-

tergenerational gardening and nature programs. Of late we have been collaborating even more extensively with our local nature center. Located quite close to the school in the Doan Brook watershed, the Nature Center at Shaker Lakes has a series of boardwalks that are wheelchair accessible and are decorated with inscribed quotes from Rachel Carson. It is here that our young students and elders created and collected the stories that led to their being awarded a First Prize in the EPA Rachel Carson's *Sense of Wonder* multimedia contest last year.[10]

Currently we are extending our gardening programs to include a food-producing, permaculture model called an Edible Forest Garden.[11] In the school we expect our learners of all ages to work the soil and help produce food in a manner that teaches about ecosystems, local economies, and healthy eating. It is in this school and garden that I will develop an intergenerational health and wellness practice with colleagues in family medicine, nursing, and other professions.

This school and garden-based health practice will focus on long-term systems thinking and help create the values and collective wisdom necessary for sustaining our community. Our focus on the necessity of water and watersheds for human life and is inspired by the work of Rachel Carson. Although Ohio is not known for its mountains, the upper Shaker Lakes are located on an escarpment approximately 1,000 feet above the level of Lake Erie into which the Doan Brook flows. Moreover, our distant history is of glaciers wearing down the mountains once present in our region.

To complement our real-life learning environment we are also developing an intergenerational island school in a virtual reality environment called Second Life. In this digitally-created environment, we can not only model the Edible Forest Garden to learn how ecosystems work in that digital environment, but also offer the opportunity for students to terraform our virtual reality. The students can include hills and bodies of water in their designs in ways not possible in real life. By "creating" mountains and bodies of water in a space in which the ecosystem and march of time itself can be modified, students learn to think about systems and use metaphors like "think like a mountain" and "feel like water." Hence, we're trying to create an environment in which city children can work with college, nursing, and medical students as well as elders to develop the long-range thinking necessary to ensure the future of our species. In this endeavor, we are inspired by the life stories and the thoughts and values of the likes of Aldo, Van, Arne, and Rachel.

LAST REFLECTIONS AND THE WAY FORWARD

I was drawn to both the commonalities of thinking and behavior among the three men and the differences between them (and my original stance in the world) and Rachel Carson. Leopold, Potter, and Naess all thought about systems of interconnecting parts in interdisciplinary ways. Each considered the limitations of human thought processes and actions in the world, thus promoting a profound humility about the human condition. Each valued the power of language in changing human behavior. All were deeply concerned about the future and of the role of the human species in it. Each recognized that huge challenges lay ahead in a time before many others came to appreciate our plight. Each was an actor in the world in their professions: Leopold as the developer of game management, Potter as an early biochemist and oncologist, Naess as a political activist, and Carson as a biologist writer. Each was an academic in part but shared ambivalence about the role of universities. Each saw their field of engagement as the whole planet and its peoples. Each was respectful of biological and cultural diversity. They were authentic—i.e., they lived their own philosophies in their daily lives. Each was a person who attracted others to their cause and was willing to make personal sacrifices.

> "It is learning that gave us power as a species in the world, and it is learning that offers us our best hope.

For me Rachel Carson played a special role. During my career as neurologist, cognitive scientist, and ethicist, I was strong on brain and thinking but relatively weak on heart and emotions. As a scientist, I lamented the loss of awe and mystery in the process of trying to understand natural and human systems. During my career the essence of the scientific enterprise has seemed to move from wonder and wholeness to finance and fragmentation. Carson had all the virtues of the men described above (as best I understand her life and work) but that "sense of wonder" was expressed particularly powerfully (and even in the title of one of her books). She seemed more fascinated with water and the seas around us than perhaps the land and the mountains above us. I also came

to act on this inspiration from Carson and devote more of my teaching to water. Whether with medical students at the level of physiology or communities and watersheds, we should emphasize that the need to avoid thirst and to maintain quality water supplies will be key to our personal and species survival . People die (as I knew personally from my work on the end of life and dementia) after a short period of dehydration. So understanding the power and poetry of water systems will be more important than understanding mountains. Moreover, as discussed above, water can exist in three very different states—gas, liquid, and solid. This property struck me as representing well the changeable states of emotions. The words used to describe the formation and movement of water seem to imply process and energy more than (relatively) static mountains. Water is more immediate and less remote than larger land forms. Water connects all living creatures with the earth. As I said before, I also came to realize that water was in some sense more powerful than mountains (glaciers, floods, even trickles from springs over time can erode mountains). This water metaphor was associated with my recognition that humans need to see themselves more as animals with emotions than as a kind of supernatural cognitive species.

All four of my environmental heroes saw the need to act. Now, decades after their work in the world, that need for engagement is even greater. But we are likely too late to avoid even greater environmental disasters and human suffering to come. With the possible exception of geological events like volcanoes and earthquakes, there are no natural disasters anymore. Human influenced global warming and changes in sea levels are affecting every meteorological event. Diseases affecting many species, including ours, are spreading in somewhat predictable ways following the changing temperatures.

But we do need to stay firm to the idea of thinking globally and acting locally (and also thinking and valuing locally and acting globally). In The Intergenerational School we have started a project in which our youngsters interview local environmental activists. These activists saved the Doan Brook and our nature center from a corrupt county engineer who wanted to put a freeway through our watershed in the 1960s. By creating the opportunity for young students to learn what these elders did in the past to make it possible for all of us to enjoy the brook today, we hope to motivate them to address the future challenges of the brook (like the mixing of raw sewage and runoff waters during flooding).

Ultimately the world will become what it will become with little regard for its hospitality toward its current dominant, sentient species. When the picture is too big and bleak, the best course of action is to take manageable and wise steps in one's own sustainability journey. It is learning that gave us power as a species in the world, and it is learning that offers us our best hope. Fostering learning in community is what the school aspires to. It is what Leopold, Potter, Naess, and Carson did in their own lives, and what they continue to inspire us to do, today and for the future.

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NOTES

1. V.R. Potter, *Bioethics: A Bridge to the Future* (New York: Prentice Hall, 1971).
2. V.R. Potter, *Global Bioethics: Building on the Leopold Legacy* (East Lansing: Michigan State University Press, 1988).
3. P.J. Whitehouse, "Van Rensselaer Potter: An Intellectual Memoir," *Cambridge Quarterly of Healthcare Ethics* 11, no. 4 (2002): 331-34.
4. P.J. Whitehouse, "The Rebirth of Bioethics: Extending the Original Formulations of Van Rensselaer Potter," *American Journal of Bioethics* 3, no. 4 (2003): W26-W31.
5. V.R. Potter and P.J. Whitehouse, "Deep and Global Bioethics for a Livable Third Millennium," *The Scientist* 12 (1998): 1-9.
6. R. Carson, *Silent Spring* (Boston, MA: Houghton Mifflin Harcourt, 2002); R. Carson, *The Sea around Us* (New York: Oxford University Press, 2003); and R. Carson, *The Sense of Wonder* (New York: HarperCollins, 1998).
7. P.J. Whitehouse, K. Maurer, J. Ballenger, *Concepts of Alzheimer Disease: Biological, Clinical, and Cultural Perspectives* (Baltimore, MD: John Hopkins University Press, 2000).
8. P. J. Whitehouse and D. George, *The Myth of Alzheimer's Disease: What You Aren't Being Told About Today's Most Dreaded Diagnosis* (New York: St. Martin's Press, 2008).
9. For additional information see The Intergenerational School's Web site at http://www.tisonline.org.
10. EPA Rachel Carson multimedia award on our work with the Nature Center at Shaker Lakes, at http://www.epa.gov/aging/resources/thesenseofwonder/2009/dance/dance02.htm.
11. Edible Forest Garden, a concept developed by David Jacke with implementation at our school led by Brett Joseph, at https://sites.google.com/a/case.edu/fairhill-partners-forest-garden-information-and-research/work-products-1.

Photo Credit: Online image. McArdle Laboratory for Cancer Research. 16 December 2010. <http://www.mcardle.wisc.edu/memorial/potter_obit.html>

Measures of Time: Exploring Debt, Imagination, and Real Nature

By JULIANNE LUTZ WARREN

"Without memory there is no debt," writes Margaret Atwood in her 2008 book *Payback*—a series of lectures that explores debt as an imaginative construct. If the construct of debt requires memory, Atwood reasons, "debt [also] involves a plot line," that is, a string of actions occurring over time, beginning with a handshake and heading toward a due date. [1] It is increasingly evident that the human economy is reversing some of Earth's long-term trends. Modern conventional measures of a successful human economy have taken little account of the harmful consequences of such reversals. Many storytellers, however, have tried to incorporate nature's realities into their understandings of what it means for a human economy to be truly profitable for the long-run. What might we learn, then, from such stories about the give and take between humans and Earth? Might they be helpful in re-conceiving notions about debt in ways that are mutually beneficial to all life?

DIVERGENCE

Beginnings—of Earth and of humanity—are a good place to start, to briefly trace what turn out to be their diverging stories of progress and measures of time and of debt.

Earth is a 4.5 billion year old planet. Earth's life appeared about 3.5 billion years ago. Our species *Homo sapiens* has been around for only about 200,000 years.

Nature may seem to humans, looking backward from the point of our own existence, to move with infinite slowness. Across time—beyond what we can ever imagine—Earth's geological foundations formed. With sunlight streaming down to warm the relatively cool, watered body of this globe, photosynthesizing life began mysteriously. Since then, Earth's interdependent biological diversity, complexity, and fertility have increased, helping generate along the way a planetary atmosphere and climate conditions to which life is adapted.

Since at least the 1920s, Western ecologists have conceptualized nature as a multi-dimensional pyramid with layers from foundation to pinnacle connected by a circuitry of food energy flows. [2] In simplified form, on the bottom of the ecological pyramid are waters and soils created from bedrock and teeming underground life. Above ground are multitudes of photosynthesizers—the primary producers, making food from sunlight, water, and soil nutrients—everything from algae to sequoias. On top of the primary producers are numerous primary consumers—the herbivores, like deer or leafhopper insects. On top of the herbivores are a fewer number of secondary consumers—the carnivorous predators like sharks, wolves, and eagles. (Humans, as interdependent omnivores, naturally fall somewhere above the herbivores and below the top carnivores—alongside bears, raccoons, and squirrels). Nutrient atoms weathered from bedrock and captured from air by soil bacteria cycle upwards through such pyramids, which are filled with countless such intricately interconnected foodweb relation-

ships, and then are released back down to the soil or water—via defecation and death—to be taken up again by other life forms, and so on. The more biologically diverse a pyramid or, in other terms, an ecosystem is, the more likely it is for nutrient atoms to be recycled indefinitely and retained within it before being carried downhill via rain, wind, and gravity to rivers and eventually the bottom of the ocean.[3] On balance, the gain of nutrient fertility taken up by life and cycling through ecosystems has tended to be greater than the loss over long ages. Similarly, over evolutionary time, more life forms have been created by natural selection than have gone extinct, for a net gain in diversity. Meanwhile, increasingly diverse and fertile interconnected pyramids of plants and animals exchanging carbon dioxide, oxygen, and other gases link bedrock to atmosphere, fostering a dynamic global equilibrium over the long term.

"Aided by scientific discoveries, modern society seeks by controlling nature to progress rapidly toward the lure of infinite wealth. Wealth has been not so much simply a destination, though, as an object of worship.

Over billions of years, Earth's nature has generated capacities for its own self-renewal. "Endless forms . . . have been and are being, evolved," in Charles Darwin's words. Functioning together, they have been collectively promoting what the twentieth century ecologist and conservation thinker Aldo Leopold termed nature's integrity, stability, and beauty—or in other words, its health.[4] For those concerned with a broad range of life's values, vibrant health is a measure of ancient nature's perpetual progress.

It is difficult to say exactly when in the 200,000 year history of *Homo sapiens* our species embarked on a different trajectory of progress, forwarding the present world-dominating human economy—the way multitudes have come to manage feeding, clothing, sheltering, reproducing, and amusing themselves. The starting point might be the point at which we *Homo sapiens,* taking our first breath, realized we could expand our power on the world from mind to hand to tool. Or it might be when we began gathering in groups to plow soil and grow food. It might be when we considered ourselves "enlightened"—believing nature to be nothing more than physical matter for us to manipulate it in order to improve our condition. Or perhaps it was when the "enlightened" brought their ambitions to improve the world to bear on a fresh new continent they named America, which was both a reality and a symbol of the riches of the good life many people longed for. Or it might be when our species numbers reached the one billion mark fewer than two hundred years ago, and unbridled capitalism combined with industrialism and a belief in Earth's inexhaustibility—physical and biological laws aside—further accelerated human population growth, which has required an increasing stock of resources from across the globe. The prodigious powers of technology and industry have helped the human population to burgeon to over 6.8 billion today. [5] Whatever time we may take as our starting point, relative to the Earth's long history, *Homo sapiens* have developed their present massively complex, world-encompassing economy in an incredible flash.

Indeed, the swift pace of the rise and ongoing growth of humanity's current global economy defines it as much as anything and drives its expanding spatial scale. To measure its success, modern Western society—with Americans most recently leading the pack—has also established a different standard of progress than the health of the Earth. Our present economy, writes author and climate change activist Bill McKibben in his 2010 book, *Eaarth,* "is like a racehorse, fleet and showy. It is bred for speed. . . . The thoroughbred, like our economy, has been optimized for one thing only: pure burning swiftness. (Also, both are now mostly owned by sheikhs)," he adds.[6] Aided by scientific discoveries, modern society seeks by controlling nature to progress rapidly toward the lure of infinite wealth. Wealth has been not so much simply a destination, though, as an object of worship. "There is no country in which so absolute homage is paid to wealth" as America, wrote nineteenth-century poet Ralph Waldo Emerson.[7] Progress American-style has "no goal," believed Massachusetts' governor Edward Everett back in 1840, "and there can be no pause; for art and science are, in themselves progressive and infinite. . . . Nothing can arrest them which does not plunge the entire order of society into barbarism."[8] This society invents ways to get its economic horse to circle the track faster and faster, without rest, churning nature into money and using that money to churn more nature into more money and so on. With the blessings of increasing wealth, its members believe, come freedom—freedom from insecurity, from fears

of hunger, hard labor, and poverty. More and more bushels of wheat, barrels of oil, bathtubs, iPods, SUVs, and rising GNPs have become not only the measure of economic progress, but even human success.

ACCOUNTING

It wasn't until 1878—a little more than a century after the American Declaration of Independence—that the United States government, now self-entitled proprietor of one of the world's most fertile regions, published its first *Official Statistical Yearbook* in order to keep track of the nation's economic progress. Until then, nature was so abundant on the vast North American continent that the new Americans had not found it necessary to keep accounts of their expenditures and production, let alone attend to the health of the Earth, which was vibrant indeed.

In fact, so easy was the American farmer's lot with "nature in her prime" in the late eighteenth-century, as Pennsylvanian farmer Richard Peters explained in a letter to British agricultural author Arthur Young, that there was no need for individuals to make "nice calculations" about profits.[9] The land's wealth was there for the taking, and there was more than enough for everyone, so why bother with figures? Indeed, in 1792, George Washington humbly confessed his own share of ignorance when he could not answer "how many sheep an acre of woodland pasture would support."[10] Likewise, Thomas Jefferson admitted that he had not thought of calculating "what were the profits of capital invested in Virginia agriculture." And almost a quarter of a century later America did not yet have "metallic measures of values" for land and no "stable index of real value."[11]

Washington, more clearly than most, understood that such lack of land-use accounting may eventually have risky repercussions. Because land was so much cheaper than labor (especially because of slavery and indentured servitude), the nation's farmers, "if they can be so-called," he noted disparagingly, tended "not to make the most they can from the land . . . the consequence of which has been, much ground has been scratched over and none cultivated or improved as it ought to have been." Farmers tended to "cut down" and keep "a piece of land under constant cultivation," he explained, "until it will yield scarcely anything; a second piece is cleared and treated in the same manner; then a third and so on." Washington doubted that the "wretched"[12] land-use habits of Americans would be conquered by anything "short of necessity."[13] The easiest and most frequently chosen option for ongoing economic improvement was to substitute quantity of acres farmed for quality of farming, spreading the destruction of land and propelling migration westward.[14] Already by the last decade of the eighteenth-century, the speed of expansion into the regions west of the Potomac River was "beyond conception," to Washington's mind. He could glimpse that a future in which the land would be filled up with people and scratched over with plows might be quickly approaching.[15]

It was difficult for many, though, to reconcile the reality of rapid land exhaustion with impressions of North America as a vast, practically inexhaustible continent. Thanks to that "powerful enchanter, Time," in the words of Charles Dickens, a future in which good land had run out appeared far distant, or at least could be pushed off into an unforeseeable age by buying up more space and inventing better methods of land management.[16] Jefferson—the visionary principal author of America's *Declaration*, and the nation's third president—could see, as did Washington, that American agriculture was impoverishing land. In severe cases, he recognized, it would take a long course of years for recovery. Indeed, some of his own Virginia fields by the 1790s had been "completely exhausted by perpetual crops of Indian corn and wheat alternately."[17] Yet Jefferson also believed that the country's original soil was so fertile that with better management it would exhaust only slowly, if ever. Better management would become more important as population increased until there was more labor than land, he understood. But in 1793, in his home state of Virginia, it was still cheaper to buy an acre of new land than to add manure to replace depleted fertility on an old one.[18] And, thinking in terms of democratic economy, Jefferson implied that the problem of the still-distant future would be overproduction, not land depletion. Even before the Louisiana Purchase, he wrote that there were "now lands enough to employ an infinite number of people in their cultivation . . . our citizens will find employment in this [farming] line, till their numbers, and of course, their productions become too great for the demand, both internal and foreign. This is not the case as yet, and probably will not be for a considerable time."[19]

With far less thoughtfulness than Jefferson, the Pennsylvanian farmer Peters was at least as sanguine about America's landed future. Where people's families outgrew their properties or when they were simply

tired of their own farms, Americans could and did sell them and move to fresh land. A burgeoning population would, in fact, make land increasingly valuable on the market, Peters understood. Because of this he boasted to Young that if the latter were to sell his English farm and invest his capital in American territory, he could turn a 500 percent profit on it in ten years. And while Peters, too, could imagine that new land might eventually run out and old land be worn out, yet the end of easy, sure, and fast profit-making was, to his sight, "far distant." In line with Washington's observation that only necessity would bring landowners to better land use, Peters was content to leave to future generations "the toil, calculation, and expense of renovating lands exhausted by bad tillage." When the need arises, Peters wrote, "the proprietors of old lands will adopt better systems of agriculture, which are now fast advancing."[20] Who could really say, though, which would advance faster: exhausted lands or better farming methods?

Meanwhile, between the period of the earliest European settlement and the nineteenth century, among the most obvious changes in the American landscape were that millions of bison had vanished from the North American plains, while virtually all of the salmon were wiped out south of Maine. America had also lost almost half of its original forests and considerable amounts of once-fertile soil. In 1847, Vermont intellectual George Perkins Marsh pointed out that in his home state, "for want of foresight," Americans had abused the forested hillsides. Stripped of trees, soils eroded into waterways and rains flooded them. Lush stream valleys were turning into "broad wastes of . . . of gravel and pebbles, [becoming] deserts in summer, and seas in autumn and spring." And while it had taken centuries for ancient Roman civilization to devastate its landscape, he later argued, it had taken Americans mere decades.[21] "The changes, which these causes have wrought in the physical geography of Vermont," Marsh continued, "within a single generation, are too striking to have escaped the attention of any observing person, and every middle-aged man, who revisits his birth-place after a few years of absence, looks upon another landscape than that which formed the theatre of his youthful toils and pleasures."[22]

Marsh was one of the first to speak out on the matter of humanity's debt to the land and to future generations who would require fertile places to live. In 1864, about forty years after Jefferson's death, Marsh published his major work, *Man and Nature*. In this book, Marsh argues that though humans are like all other forms of life in depending upon "the table of bounteous nature," yet they are "a power of a higher order." In fact, humans were distinguished from all other animal life, he wrote, by their tendency to unbalance nature by taking more of her provisions than they needed and more than they paid back. Man, he pointed out, "has too long forgotten that the earth was given to him for usufruct alone, not for consumption, still less for profligate waste." With mounting evidence and personal insight, Marsh built his case that it was prudentially responsible and morally right to repay "to our great mother [Earth] the debt which the [swift-footed] prodigality and the thriftlessness of former generations have imposed upon their successors—thus fulfilling the command of religion and of practical wisdom, to use this world as not abusing it."[23]

A decade and a half later, however, the first U.S. *Statistical Yearbook* did not include a column for Marsh's kind of morality. Its ledger included listings for finance, coinage, commerce, immigration, shipping, imports and exports, railroads, agricultural crops, and coal produced. There were no records for how many trees, fish, tons of minerals, or acre feet of fresh water remained. There was no attempt to account for the native people expelled, soils eroded and exhausted, plant and animal species missing, or waters polluted. There was no tally of what had been not merely used, but wasted and consumed, compromising nature's capacity for self-renewal.

> "The easiest and most frequently chosen option for ongoing economic improvement was to substitute quantity of acres farmed for quality of farming, spreading the destruction of land and propelling migration westward.

Efforts to calculate America's take of what was required for Earth's ongoing health and how much of that capacity remained would come later, and with it, a rising understanding of how difficult such calculations were to make. The formalized concept of maximum sustained yield reaches back at least to German forester Georg Ludwig Hartig's 1795 decree that "not more and not less may be taken an-

nually [from state forests] than is possible on the basis of good management."[24] But this principle proved a battle ground for the different measures of short-term market demands versus the long-term realities of nature's regenerative capacities.[25] On the one hand, it was more economically profitable to take all you could as fast as you could, turn it into money capital, and reinvest it to make more—even if it meant drawing on nature's capital, its fertility and diversity. Nature's long-term well-being didn't count in these calculations of sustainability.[26] On the other hand, it was morally responsible to life on the planet and also to future generations of humans to limit the speed and quantities of take to nature's interest, leaving its capacities resilient and productive for ages to come. This was the overriding concern of America's first German-trained USDA/USFS Chief Forester, Gifford Pinchot. In view of a looming timber famine, he urged the Progressive Era conservation ideal of better managing natural resources for the maximum good for the maximum number of people for the long term.

> "Marsh was one of the first to speak out on the matter of humanity's debt to the land and to future generations who would require fertile places to live.

The sustained yield concept was theoretically appealing to a range of twentieth-century scientists, policy-makers, managers, and economists. Calculating proper limits for sustained yields of particular so-called natural resources was, however, confounded by the vast complexities of interrelationships of nature. By the later 1930s, the well-known forester, father of wildlife management, and ecological conservationist Aldo Leopold realized that management for maximum yields of singled-out resources often ended up at cross-purposes. For example, a game manager might kill wolves believing that he was protecting deer for hunters while inadvertently creating a forest manager's nightmare of burgeoning deer herds over-browsing vegetation that would take many years to regrow. Leopold turned his attention away from resource-by-resource management to a holistic ideal that incorporated nature's interconnectedness. Ahead of his time, he came to understand that healthy nature was the only valuable nature in the long term, developing a new standard for good land use measured in terms of nature's health. A few decades later yet, fisheries biologist P. A. Larkin concluded in a 1977 review article that the whole sustained yield concept was dead and required an epitaph. He didn't know what would take its place, but he was sure that optimizing sustainable yield of resources had no guaranteed outcome. It could be "a recipe for achieving heaven or hell," in Larkin's words, depending on where you stood or how fast you ran in relation to nature's realities.[27]

Continuing into the twenty-first century, however, the concept of maximum sustained yield has hardly gone away, though it has taken on a few new manifestations in a world where buying more space is largely no longer feasible, and intensifying management has taken on greater urgency. Nobel laureate Norman Borlaug, for example, father of the "Green Revolution" in agriculture, in the 1940s began promoting around the world a cropping system involving monocultures, irrigation, fertilizer and pesticide applications, new machine technologies, credit for farmers so they can pay for these inputs, and economic markets so they can sell their harvests. His goal was to help balance the land-food-population equation by maximizing yields of food. With rising hundreds of millions of people hungry, in 2000, on the thirtieth anniversary of his award, Borlaug implored agricultural researchers to improve "maximum genetic yield potential"—the capacity of cereal crops to produce as much seed as possible—in order to sustain a maximum global human population that continues to expand. "Imagine the benefits for mankind," he pressed.[28]

It is increasingly clear that this kind of accounting—which takes the satisfaction of humanity's rapidly rising demands as its measure of progress while it largely disregards nature's time-proven, health-generating processes—overlooks a rising indebtedness and impending due date. As humans hone methods of rapidly taking from nature more than they repay, it is easy to reimagine McKibben's metaphor of the current world-spanning modern, sleek racehorse economy now running on a treadmill instead of a track. And as it does so, it turns a small, toothed gear in faster rotations against a larger, slower-cycling one. Wealth circles quickly forward, forcing nature's momentum into accelerating reverse. Rather than increasing in biodiversity, the Earth is now losing species one thousand times faster than the planet's historic rate:[29] Great Auk, Passenger Pigeon, Las Vegas Leopard Frog, and Sexton Mountain Mariposa Lily, to name a few.

Meanwhile, extinction debt—the sometimes centuries-long delayed death response of species to habitat fragmentation and loss—may raise numbers of unique life forms lost to time beyond what we have already observed or imagined. The human economy has also reversed the ancient trends of building soil fertility. Recent studies confirm that agricultural soil erosion substantially outpaces soil production worldwide and is several to a thousand times greater than pre-agricultural rates. Upwards of a third of the world's potentially farmable land has been lost to erosion since the dawn of agriculture—much of that in the past forty years.[30]

> "It is increasingly clear that [the] kind of accounting—which takes the satisfaction of humanity's rapidly rising demands as its measure of progress while it largely disregards nature's time-proven, health-generating processes—overlooks a rising indebtedness and impending due date.

Biodiversity, fertility, and Earth's composition of atmospheric gases are mutually interdependent. In addition to the contribution of carbon dioxide to the atmosphere made by burning fossil fuels—the stored remains of ancient life—as much as one-third of the total greenhouse gas buildup in Earth's atmosphere since the nineteenth century has come from cutting down trees and plowing up hundreds of millions of acres of soils, exposing fresh and long-buried organic matter to air and oxidation while at the same time diminishing ecosystem's capacities to renew their own fertility and biodiversity.[31] Present-day concentrations of carbon dioxide are higher than any that have been observed in the past 800,000 years.[32] This rapid, unprecedented change has contributed to a degree rise (Celsius) in average global temperatures since 1850 and to the destabilization of the planet's climate. This in turn has led to acidifying oceans, rising sea levels, shrinking glaciers, intensifying storms, increasingly frequent droughts and floods, changes in the timing of seasons, out-of-synch predator-prey relationships, further losses in biodiversity, and human suffering—e.g., from destruction of homes, contracting food and water supplies, and increasing disease outbreaks. Current projections are for temperatures to rise another 2.5–4.7 degrees by 2100.[33]

Moreover, the racehorse economy has had inequitable consequences for peoples of the world. While the United States, for example, has produced nearly a quarter of the world's total greenhouse gases, it has ignored its responsibility for doing so, rejecting plans to cooperate globally to cut emissions as its contributions still rise.[34] Meanwhile, those living in poverty and inhabitants of the poles, small oceanic islands, and southern nations—who contribute far less to the problem—have been among the first to suffer the consequences of climate change. These peoples additionally have been left without the option to use the Earth as the expanding economy of the West has done. As their familiar environments have been transformed by the actions of others in distant places, they have become creditors in what has been termed ecological debt.

In sum, the capacity of Earth to renew itself and support life has been swiftly altered and impoverished by the urgent and rising demands of the predominating human economy. The accumulation of economic wealth for the good of some has globally outpaced nature's capacities to renew its own health for the good of all.

THE WITNESSES

These developments have not gone unnoticed. The Earth, if perhaps relatively long-suffering, bears an indiscriminate witness to human responsibility for ecological debt. Bearing witness, too, are a line of justice-minded storytellers—part of Western civilization's conscience—offering to help its members remember that they know they should be acting better. Stories, as Czech author Milan Kundera observes, help us to examine what has been in us for a long time and what possibilities remain within us as beings in the world, and thus, for the world. There are many voices from among whom to choose.[35] I have selected a handful who seem to know in their souls not only about the material imprudence of using short-term wealth as a measure of good life, but also about the immorality of neglecting the fuller, fairer measure of nature's enduring health.

Retribution Has the Fastest Horse

In Washington Irving's 1824 "The Devil and Tom Walker," Tom became wealthy by making a deal with the Devil and agreeing to make more money by abusing broke, land-ravaging speculators. Legend has it that Tom, in a moment of panicky remembrance of his

own growing debt, buried his new horse upside down—one of the fine animals that pulled his fancy carriage with un-oiled wheels squealing like the souls of the debtors he was squeezing. Tom figured that when the Devil came to collect on Tom's own debt, sometime in the still-distant future, the world would be turned upside down and his horse would thus be ready for quick mounting. This was a superfluous precaution. For one day—as Tom was in the midst of a usurious transaction—three knocks came on his door. There waiting stood a black man holding a black horse, who whisked him into the saddle, the "steed striking fire out of the pavement at every bound." In the Biblical book of Revelation, the black horse is the one that bears the scales. Indeed, members of a society in which one of its self-proclaimed religious leaders can laugh publically at the realities of global climate change, exclaiming, "I don't believe a moment of it. The whole thing is created to destroy America's free enterprise system and our economic stability," might do well, as Marsh urged almost one hundred and fifty years ago, to re-consider its priorities and hubris in light of what its own true faith has always demanded.[36]

We Should Beware of Lightning Fast Carriages

Charles Dickens was a big fan of Irving's, and, like him, mingled insights about debt, nature, and the economy with significance resonant on both sides of the Atlantic. In his 1859 novel *A Tale of Two Cities,* set in late eighteenth-century France and England, Madame Defarge slowly and patiently knits the names of the wealthy who obtained their luxuries by taking from others and from the land itself what was necessary for life and its regeneration. Nothing less than the blood of these rich debtors will be required as repayment by those left poor, in whom the desires for good lives still madly burn. Madame Defarge asks her husband, who is impatient for the inevitable vengeance to strike, "How long does it take to make and store the lightning? Tell me."[37] A long time, we might thoughtfully suppose, as did Monsieur, a long time in the making. But when it does strike, it does so in an instant and is beyond our ability to predict.

Madame Defarge's slow knitting, with its mortal implications, has parallels today in the natural world in actual, not metaphorical, lightning. "We are in the mega-fire era," says Ken Frederick, a spokesman for the U.S. federal government, referring to the climate-change induced consequence of larger storms over land now creating more lightning-initiated blazes.[38] And, indeed, unhurried as Earth's processes may seem when compared with the human economy, nature's changes may happen in what seems like a flash. A lightning bolt helps make molecular nitrogen in the air available to plants, feeding them and contributing to the long-term fertility-building and diversity of their ecosystem, but it may also sear an oak tree, start a blazing fire, and turn a forest and its inhabitants into ashes overnight.

In another scene in *A Tale of Two Cities,* a wealthy marquis in a wildly fast carriage drawn by four strong horses runs over a poor man's child—the wheels come to a "sickening little jolt." In response, the marquis tosses a coin out the window to the child's grieving father, intending to pay off in this way his debt of life. The father secrets himself under the carriage, riding amidst the dust clouds of the churning wheels. The carriage slowly passes up a long hill through a landscape as bony and withered as the country people, enduring starvation, and then to the green of the marquis's luxurious stone estate. In the black of night, the father murders the marquis, turning his soft pillow red. Thousands more like him would be dead within a few years. Riders in fast coaches, because of what they could offer to pay in coin for Earth's treasures, were condemned for incurring inappropriate debts, and then denounced, and beheaded.

We Should Beware of Fast, Horseless Carriages

It is Dickens's old, familiar, truthful works that quiet the startled mind of Mr. Julian West in Edward Bellamy's 1888 *Looking Backward*, as he sits in his hosts' library trying to get a hold on himself. The privileged traveler Mr. West has discovered himself awakening suddenly out of the class injustices of 1887 Boston and into the same city, now characterized by perfect equity a mere 113 years later, in the year 2000. Imagine society of 1887, the narrator suggests, as a "prodigious coach" on which ride only the relatively few wealthy. The coach is pulled not by horses, but by the starving masses, driven by hunger. In the imagined society of 2000, however, everyone takes turns pulling, and everyone takes turns riding. People's wants have become, amazingly, not a debit, but a credit, helping promote an economy that sustains and builds up the Earth so that it produces more wealth with an efficiency that makes it possible to meet everyone's desires and to eliminate all fears bred of insecurity. The machinery of the national, globalizing economy in this story is like a "gigantic mill," we learn, "into the

hopper of which goods are being constantly poured by the train-load and shipload, to issue at the other end in packages of pounds and ounces, yards and inches, pints and gallons."[39]

This imagined world may be remarkably egalitarian in terms of meeting people's material demands, but independent nature is ended by human control.[40] Whatever has been wild and unpredictable—that perpetual play of forces that kept a diversity of life, in complex equilibrium, humming—has been brought into ultimate submission, conscribed to run its perpetual paces round and round the economic track, fueled by belief in human ingenuity.[41] Yet Bellamy's older contemporary, the naturalist John Burroughs, recognized that it was the long ages of the give-and-take of nature's forces that kept the world alive. "Nature does not balance her books in a day or in ten thousand days," Burroughs writes, "but some sort of balance is kept in the course of ages, else life would not be here. Disruption and decay bring about their opposites. Conflicting forces get adjusted and peace reigns. If all forces found the equilibrium to which they tend, we should have a dead world—a dead level of lifeless forces. But the play of forces is so complex, the factors that enter into our weather system even, are so many and so subtle and far-reaching, that we experience but little monotony. There is a perpetual see-saw everywhere, and this means life and motion."[42] As Leopold would put it later in the next century, "too much safety seems to yield only danger in the long run. Perhaps this is behind Thoreau's dictum: In wildness is the salvation of the world."[43]

One person's utopia can be another's nightmare—indeed a whole world's nightmare. We know with increasing certainty today that humans are not smart enough to manipulate nature to maximize benefits for themselves for the long term. Moreover, controlling nature's wildness seems to go hand-in-hand with subjugating human liberty. In *Looking Backward,* for instance, Dr. Leete, Mr. West's twenty-first-century guide, unwittingly compares the humans laboring in this imagined economy to a "disciplined army" under the one head of money capital as "under one general—such a fighting machine, for example, Bellamy wrote, as the German army in the time of Von Moltke."[44] As Lewis Mumford recognized in his 1922 *The Story of Utopias,* Bellamy's imagined world already was all too real.[45]

There Is Wisdom in Walking

According to literary scholars, since at least the later part of the twentieth century—parallel with rising detrimental effects of human economy on nature's health—there has been a decline in the quality and quantity of Western utopian literary works, and an upsurge in dystopic visions.[46] Their authors—and readers—are not sure if perhaps a consequence of destroying so much of our own species' habitat might not require our own extinction to pay our debt to nature. We don't know how long we might have to try to make amends, or whether it is even worth making the effort. In these dark stories are signs, though, that the deeper, intuitive parts of us still have not have entirely forgotten, after all, the truth of where our breakfasts come from, or that measuring goodness with money and not abundant, healthy life is not only imprudent, but morally untenable.

One of these dark stories seeded with conscience's light is told in the ashen landscape of Cormac McCarthy's *The Road*. The human economy and Earth's capacities for self-renewal have been leveled by a fiery disaster. They now walk together at the same slow pace. There are no carriages, no racehorses, no plants, no animals—nothing growing at all that we can perceive. A tattered remnant of humanity turns cannibal. A smaller fragment still struggles to cling to virtue and to resurrect memories of its past—colors, the names of birds, things to eat—that are quickly fading, as is its future. These answer the urge to live, and to live decently, even in the worst of times by delving into earthen cellars for the remains of stored foods, in an economy of absence.

> "Perhaps among the most important things of all that are being lost in the bargain between the human economy and Earth's health is the "wisdom of slowness" and its "pleasures" ...

The heart of the story is told in spare conversation between a father and son on a journey downhill toward the ocean, where all life eventually finds its end, and its beginning. A few simple and slow pleasures remain—a sip of water, a surviving can of peaches—but what has been gained, in the end, is the wisdom of slowness.[47] "No list of things to be done," thinks the father to himself as he lay in the dark, resting in the

hours between days of walking. "The day providential to itself. The hour. There is no Later. This is later. All things of grace and beauty such that one holds them to one's heart have a common provenance in pain. Their birth in grief and ashes. So, he whispered to the sleeping boy, I have you."[48]

On Earth there remains bedrock, water, wind, and fire. "The fire," asks the little

boy: "Is it real?" His dying papa answers, yes: "It's inside you," he says, "It always was there. I can see it." A short time later, goodness in the form of a motherly woman finds the boy, now orphaned, and she talks to him sometimes about God. The boy tried to talk to God, "but the best thing was to talk to his father," the boy thought, "and he did talk to him and he didn't forget. The woman said that was all right. She said that the breath of God was his breath yet though it pass from man to man through all of time."[49]

McCarthy's story is a grave reminder. Perhaps among the most important things of all that are being lost in the bargain between the human economy and Earth's health is the "wisdom of slowness" and its "pleasures," in the words of Czech novelist Milan Kundera.[50] In the haste of the modern human economy we are losing the greater meaning of nature, in Thoreau's sense—the sense in which walking on footpaths through grasslands and forests recalls to us the reality that the smallest unit of health is that of the community of nature, of which we are interdependent members with all of Earth's life. In subduing wild nature in a rush, trusting to the mighty steed of our economy, we are also losing our memory of nature as it was before we changed it. "It might be wise," wrote Leopold ironically in the 1940s, to prohibit at once all teaching of real botany and real history, lest some future citizen suffer qualms about the floristic price of his good life."[51] Without memory—without witnesses—there is no debt, no story, no imagination, and no fresh possibility.

RE-PACING

It may be, concludes McKibben in his 2006 edition of *The End of Nature,* that the key environmental fact of our time is "the contrast between the pace at which the physical world is changing and the pace at which human society is reacting" to the consequences of those changes.[52] We might also say that the contrast between the pace at which we have been changing the world and the pace at which nature is responding is a vital factor in shaping future world conditions. Much may be regained by putting the economic horse out to pasture—give it a rest. Much may be regained, on balance, for life, paradoxically, by slowing down the global economy as quickly as possible—slowing down human reproduction rates, slowing down the time it takes to craft a product and the time between possessing it and throwing it away, slowing down the ways we gather food, slowing down the time it takes to cook and to eat food, slowing down to a walk on a path through the woods and the fields or from our homes to our offices, places of worship, parks, and pubs. Walk more. See more. Save more. Buy less. Shrink our overbearing, consumer-driven economy's presence on Earth. For like Lewis Carroll's Alice, when the magic cake wears off, we too have discovered that growing fast also makes us dangerously big—so big that we tip things over and are forced to leave Wonderland. In slowing down, society's members may regain much by spending freed time in humbly remembering that wide range of deep-seated, very old human values that—given that lightning doesn't strike quite yet—may carry us beyond the worship of short-term wealth to embrace the possibility of vibrant, dynamic, long-term health of Earth and our own species. Imagine the truth. Ask for forgiveness. Hope for mercy. For, if we can't pay off our debt, at least we can die trying. We have it in us.

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NOTES

1. M. Atwood, *Payback* (Toronto, ON, Canada: Anansi Press, 2008), 81.
2. C. Elton, *Animal Ecology* (Chicago, IL: University of Chicago Press, 2001). First published in 1927, Elton introduced his "pyramid of numbers." Nature may be conceived as a pyramid based on body size and food relationships, as well as energy losses in transfers from lower to higher trophic levels. Elton writes: "the animals at the base of a food-chain are relatively abundant, while those at the end are relatively few in numbers, and there is a progressive decrease in between the two extremes" (p. 69). The small animals closer to the base tend to reproduce very quickly and become numerous and those higher up, which eat those lower down, tend to be larger and slower at reproducing and thus fewer in number.
3. Based on Aldo Leopold's essay, "Odyssey," in *A Sand County Almanac* (New York: Oxford University Press, 1987), 104-7. *A Sand County Almanac* was first published in 1949. Leopold drew on the work of animal ecologist Charles Elton (see endnote 2).
4. C. Darwin, *On the Origin of Species* (London: London Folio Society, 2006), 388; Leopold, *A Sand County Almanac*, 221-25.
5. S. Stoll, *The Great Delusion* (New York: Hill and Wang, 2008). Stoll discusses the history of economics in relation to the history of physics, noting that: "[nineteenth-century] Economists seized upon physics without understanding the full implication of the categories they clumsily translated into human action" (p. 145). And it has become increasingly clear that at some point it is not tools for mining "natural capital"—like certain fish, for example—that are the limiting factor in take, as Adam Smith might have it, but how many fish there are remaining to catch, if any (p. 155).
6. B. McKibben, *Eaarth* (New York: Times Books, 2010), 103.
7. R.W. Emerson, *The Complete Essays and Other Writings of Ralph Waldo Emerson* (New York: The Modern Library, 1950) 604.
8. As quoted in Stoll, *The Great Delusion*, 19.
9. See Notes by Richard Peters on Arthur Young's correspondence, January 15, 1793. In F. Knight, ed., *Washington's Agricultural Correspondence :To Arthur Young, Esq. F.R.S. and Sir John Sinclair, Bart, M.P. with Statistical Tables and Remarks by Thomas Jefferson, Richard Peters, and Other Gentlemen on the Economy and Management of Farms in the U.S.* (Washington, DC: Franklin Knight, 1847), 104. Peters is responding to Young's questions about whether American farmers could carry on without calculating profit by percent on capital.
10. Letter from George Washington to Arthur Young, from Philadelphia, June 18, 1792. In Knight, *Washington's Agricultural Correspondence*, 64.
11. Thomas Jefferson to Jean Batiste Say, Monticello, March 2, 1815, in E.E. Edwards, *Washington, Jefferson, Lincoln, and Agriculture* (Washington, DC: U.S. Bureau of Agricultural Economics, 1937), 69.
12. George Washington to W. Strickland from Mt. Vernon, July 15, 1797, in Edwards, *Washington, Jefferson, Lincoln, and Agriculture,* 32.
13. George Washington to Arthur Young, from Philadelphia, December 5, 1791, in Knight, *Washington's Agricultural Correspondence*, 32.
14. Letter from George Washington to Arthur Young, from Philadelphia, June 18, 1792, in Knight, *Washington's Agricultural Correspondence*, 63; letter from George Washington to W. Strickland from Mount Vernon, July 15, 1797, in Edwards, *Washington, Jefferson, Lincoln, and Agriculture,* 32.
15. George Washington to Arthur Young, from Philadelphia, December 5, 1791, in Knight, *Washington's Agricultural Correspondence*, 29, 32.
16. C. Dickens, *A Tale of Two Cities* (Chicago, IL: Scott, Foresman and Company: 1906), 506.
17. Thomas Jefferson to unknown correspondent, Philadelphia, March 23, 1798, in Edwards, *Washington, Jefferson, Lincoln, and Agriculture,* 62.
18. Thomas Jefferson to George Washington, Philadelphia, June 28, 1793, in Knight, *Washington's Agricultural Correspondence,* 102.
19. Thomas Jefferson to John Jay from Paris, August 23, 1785, in Edwards, *Washington, Jefferson, Lincoln and Agriculture,* 49.
20. Notes of Richard Peters on Arthur Young, January 15, 1793, in Knight, *Washington's Agricultural Correspondence,* 108.
21. G.P. Marsh, *Man and Nature; or, Physical Geography as Modified by Human Action* (New York: Charles Scribner, 1864), 1-8.
22. G.P. Marsh, "Address Delivered Before the Agricultural Society of Rutland County, September 30, 1847," Library of Congress, American Memory, at http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field(DOCID+@lit(amrvgvg02div1)), 17-18, accessed April 2010.
23. Marsh, *Man and Nature*, iii, 8, 35-37.
24. H. Rubner, "Sustained-Yield Forestry in Europe and Its Crisis during the Era of Nazi Dictatorship," in *History of Sustained-Yield Forestry: A Symposium; Western Forestry Center, Portland, Oregon, October 18-19, 1983*, ed. H.K. Steen (Santa Cruz, CA: Forest History Society, 1984), 171.
25. J. Newton, *Aldo Leopold's Odyssey* (Washington, D.C.: Shearwater Books/Island Press, 2006), 293-94.
26. For a fuller discussion of the concept of sustainability in relation to land health see J.L. Newton and E.T. Freyfogle, "Sustainability: A Dissent," *Journal of Conservation Biology* 19, no. 1 (2005): 23-31.
27. P.A. Larkin. "An Epitaph for the Concept of Maximum Sustained Yield," *Transactions of the American Fisheries Society* 106, no. 1 (1977): 1-10.
28. N. Borlaug, "The Green Revolution Revisited and the Road Ahead," Special Thirtieth Anniversary Lecture, The Norwegian Nobel Institute, Oslo, September 8, 2000.
29. E.O. Wilson et al., "Insights: Human Activities Cause of Current Extinction Crisis," *Environment News Service,* May 19, 2005, at http://www.natureserve.org/index.jsp.
30. D. Montgomery, "Is Agriculture Eroding Civilization's Foundation?" *GSA Today* 117, no. 10 (October 2007): 4-9.
31. Montgomery writes in "Is Agriculture Eroding Civilization's Foundation?": "A third of the total carbon dioxide build up in the atmosphere since the Industrial Revolution has come from degrading soil organic matter as hundreds of millions of acres of virgin land were plowed up in the late 19th and early 20th centuries." According to the Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,* R.K. Pachauri and A. Reisinger, eds. (Geneva, Switzerland: IPCC, 2007), forestry contributed about 17.4 percent and agriculture 13.5 percent of the 2004 global anthropogenic greenhouse gas emissions (36, figure 2.1). Global carbon dioxide emissions are primarily from fossil fuel; methane emissions come predominantly from agriculture and fossil fuel use. N20 emissions are primarily due to agriculture (p. 37).
32. J. Pethica et al., *Climate Change: A Summary of the Science,* (London: The Royal Society, September 2010), 6. Available at: http://royalsociety.org/Report_WF.aspx?pageid=4294972964&terms=climate+change%3a+the+state+of+the+science&fragment=&SearchType=&terms=climate%20change:%20the%20state%20of%20the%20science
33. Ibid., 5, 9.
34. E. Kolbert, *Field Notes from a Catastrophe* (New York: Bloomsbury, 2006), 148, 159.
35. M. Kundera, *The Art of the Novel* (New York: Grove Press, 1986), 115-116
36. The quote is of the late Jerry Falwell, cited in McKibben, *Eaarth*, 12.
37. Dickens, *A Tale of Two Cities*, 264.
38. McKibben, *Eaarth*, 3.
39. See chapter 17 in E. Bellamy, *Looking Backward: 2000–1887* (New York: The Modern Library, 1942).
40. B. McKibben, *The End of Nature* (New York: Random House, 2006).
41. L. Mumford. *The Story of Utopias* (New York: Boni and Liveright, 1922), 167. Hayden White, in "The Future of Utopia in History," *Historein,* vol. 7, 2007: 11-19 cites Benjamin: "The catastrophe would be if things stayed the same." (p. 14).
42. J. Burroughs, "Hit-and-Miss Method of Nature," in *Summit of the Years* (New York: William H. Wise, 1924), p. 86.
43. Leopold, *A Sand County Almanac*, 133.
44. See chapter 22, Bellamy, *Looking Backward.*
45. Mumford, *The Story of Utopias,* 167.
46. J. Rüsen, "History and Utopia," *Historein*, vol. 7,2007: 5-10; F. Manuel and F. Manuel, *Utopian Thought in the Western World* (Cambridge, MA: Harvard University Press, 1979).
47. See M. Kundera, *Slowness* (New York: Harper Perennial, 1995).
48. C. McCarthy, *The Road*, (New York: Alfred A. Knopf, 2006), 54.
49. McCarthy, *The Road*, 286.
50. Kundera, *Slowness*, 3, 36.
51. Leopold, *A Sand County Almanac,* 46..
52. McKibben, *The End of Nature,* xv.

Documenting a Moral Imperative: Filming *Common Ground*: South Carolina's ACE Basin

By WILLIAM K. BAILEY

> *It's moral, it's a moral imperative. There's no question about that. And if we were to destroy this land and render it useless or change its character or distort the history of the land and not be honest to the land, I think we've done something very immoral.*
> *— Charles Lane*
> *ACE Basin Task Force*

SAVING THE ACE BASIN

South Carolina's seacoast—some two hundred miles of beaches, estuaries, natural harbors, and maritime forests—is a financial blessing to the state. Year round, vacationers, eager to bathe in the sun and surf, fill the hotels, condominiums, campgrounds, and beachfront homes. Visitors who combine short business trips with golf and fishing often return to their northern homes already shaping plans for migrating to this American Cote d'Azur, with its temperate climate and secure gated communities. The resulting growth has been financially dynamic for developers and entrepreneurs as well as a source of jobs for construction workers, hotel staffs, and retail employees. This growth, however, has also exacted a price, for it has damaged or destroyed thousands of acres of wetlands, homes to countless species and the spawning grounds for marine life. While no one doubts that this employment is important to the people of a state with staggering financial woes and a struggling educational system, a careful look at the Lowcountry's history since the second World War points to the structural growth that has crept from coastal South Carolina's northern and southern tips, each fairway, cul-de-sac, and marina bringing jobs but simultaneously destroying the ecosystems that nurture a treasured coastline.

During the mid-1980's, this growing threat to the environment began to alarm many South Carolinians, especially those who had for generations lived in the ACE River Basin, an area south of Charleston and north of Beaufort whose core area comprises approximately 350,000 acres of barrier islands, wetlands, swamps, timber stands, and upland. Named for the Ashepoo, Combahee, and Edisto Rivers that flow through the region into St. Helena Sound, the basin is a favorite refuge for waterfowl along the Atlantic Flyway, home to countless species of flora and fauna, and a source of livelihood for fisherfolk, timber growers, and farmers. Moreover, it is a loved destination for naturalists, scientists, hikers, hunters, and boaters. Losing the ACE Basin to development would be to lose not just a way of life, but home itself. For the Basin to be overcome by growth from the north and the south would mean not just the loss of livelihood, but the loss of identity as well. The ACE Basin, however, was not lost, and the story of its conservation is the story of how love of the land inspired bold, creative action. The Center for Humans and Nature's production of the documentary *Common Ground: South Carolina's ACE Basin* tells the story of the land and the people whose conservation efforts were and continue to be nothing less than heroic. This story has its roots, however, in over two

centuries of plantation development.

The economic system of the plantations relied on slaves who, as they worked the land for their masters, imbued the region with a rich cultural heritage that continues to flourish. Among their accomplishments was the creation of a rice culture, a system of growing rice along the rivers in diked impoundments, which are earthen structures irrigated by water-controlling trunks—ingenious devices, likely of West African origin, that used the rivers' tides to flood and drain the fields. Though the Civil War freed the plantations' workforce, the impoundments remained, their remnants continuing to serve as ideal habitats for wildlife both on and under the water. Thus, though efforts to continue growing rice failed and the land held little economic value as the twentieth century rolled around, owners of large tracts either retained their property or sold it, often to wealthy buyers from the north who sought warm winters and beautiful surroundings amid a hunting and fishing paradise.

These owners—people like the Dodges, Pratts, and DuPonts—cared for the land, changing virtually nothing in a landscape where commercial and recreational fishing, hunting, and farming had been dominant. Two families, however—the Lanes of Charleston and the Donnelleys of Chicago—assumed early leadership in a land conservation movement that eventually became the ACE Basin Project. These extended families embraced conservation easements as the primary tool for saving critical ecosystems from unbridled development. By placing his or her land under an easement, the owner agreed to an arrangement that in exchange for tax advantages protected the land for its traditional uses in perpetuity, even when ownership changed. Hugh Lane, Sr., and Gaylord Donnelley were held in such high regard as businessmen and civic leaders that their decisions to place their land under easements and their championing of environmental causes led to the protection of scores of tracts by private landowners. Thus was born a heretofore unheard of conservation team that brought together the combined efforts of individual stakeholders, governmental organizations like the South Carolina Department of Natural Resources and The National Fish and Wildlife Service, and non-governmental groups like Ducks Unlimited, the Nature Conservancy, and The Edisto Island Open Land Trust.

The leaders of these groups formed the ACE Basin Task Force that continues to promote land protection and the well-being of existing easements. Though the group began their work thinking their goal to conserve 90,000 acres was ambitious, by November 2010, more than 206,000 acres were protected forever. Early fears of governmental land grabs have evaporated as thousands of outdoor enthusiasts visit the Basin each year and as the citizens of the area have realized the economic benefits of this bold project. Still, the region has many poor citizens for whom much needs to be done to enhance farming and the growth and use of timber, but the efforts underway and the benefits that may result will be carried out in an environment where a covenant between humans and the natural world is the paramount principle. Michael Prevost, who was present at the outset of this conservation movement, speaks with a quiet passion about his involvement in this magnificent region toward the end of the documentary:

> It's something I've always believed in, it's something I've always had a vision for, and something I've always sought to do, to think collectively and broadly about large-scale land conservation and focusing on critical coastal habitats, both from a recreational standpoint and leaving a lasting legacy for future generations, not only for their quality of life but the health of the planet and what it means to the state of South Carolina.

THE MAKING OF COMMON GROUND

Shortly before his death in 2008, Dr. Strachan Donnelley—founder of the Center for Human and Nature and son of the Donnelleys who contributed so much to habitat protection in the ACE Basin—asked that a history of the ACE Basin Project be written. For some reason—perhaps because I was not at the gathering where he posed this request—I was assigned the task, my rationale for completing this story as a first-person narrative. I began the project, like most tyros, by reading all I could gather about the region: its natural history and human history, as well as the physical and spiritual sustenance generations of the region's citizens had drawn from an ecosystem where tidal rivers, wetlands, timber stands, and wildlife were abundant. What I discovered was that people I personally knew and others I had heard about had for years devoted their time, talent, and wherewithal to protecting this ecological wonder from the predations of commercial ventures,

endeavors that would eventually have destroyed this environmental jewel in the coastline's crown. What I discovered, too, after visiting the ACE Basin and watching videotape of early interviews with environmental leaders in the Basin, was that the story might best be told and reach a larger audience if it were presented as a documentary film, rather than as a monograph that, however good or bad, might not reach a wide readership.

Through the School of the Environment at the University of South Carolina, I secured for CHN the services of the University's Media Service Center, whose members' artistic and technical talents were my manna in a cinematic wilderness, for without the experience and skills of director Larry Cameron and photographer and editor Joe Woodard, *Common Ground* could not have been produced. For two years, sometimes as a trio and sometimes accompanied by other media savvy colleagues, we made regular trips to the ACE Basin, where we photographed the confluence of land and water, where natural beauty is the norm and life flourishes in a glorious interdependence. We shivered at times along river banks in the minutes before dawn but forgot the cold when the sun rose over the Atlantic, the wetlands, and the mystic mists rising from the water. We battled on through a Lowcountry August when ravenous insects, intoxicated by the taste of our puny repellents, gorged on our blood while we waited for a heron to take flight or an eagle to peer out of a nest high above us.

And we met the people of the ACE Basin, who invited us into their homes and guided us through their fields as they poured out their accounts of their attachment to the land. We interviewed members of private conservation groups and a host of government employees who told us the details of the real estate transactions that had resulted in easements even as they arranged for boats and guides to carry us to areas often inaccessible to most visitors. I'll risk the charge of regional chauvinism by claiming that we were bathed in traditional southern hospitality, but the help we received emerged from something deeper than a quaint regional trait, for it came from the pride and love the people have for the land and their desire to share the glory of their home. In their sharing of their best with us, they inspired us to give our best to telling viewers about their covenant with the land.

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Common Ground: South Carolina's ACE Basin will make its Charleston premier at the Southeaster Wildlife Exposition on February 18–20, 2011. While other venues are being considered, the film will eventually be available from The Center for Humans and Nature (www.humansandnature.org).

REVIEWS & REFLECTIONS

THE REGULATION OF SYNTHETIC BIOLOGY: COMMENTS TO THE PRESIDENTIAL COMMISSION FOR THE STUDY OF BIOETHICAL ISSUES

By Bruce Jennings

I have been writing and thinking about the cultural meaning and reception of biotechnology generally, including synthetic biology, for the past several months.[1] I would like to share the following comments with the Commission.

Policy and regulation in the area of synthetic biology—as in most areas of technology and science policy and governance—will focus primarily on public safety and harm issues. Secondarily, it will focus on discrimination and equity issues if it seems to put some group at risk of social harm, or if it seems to benefit one sector of society unduly and yet be developed at public expense.

These issues are fundamental and important. For example, the potential to weaponize the products of synthetic biology poses a particularly important concern. I also think that synthetic biology promises to be a kind of garage technology that will pose some especially difficult challenges for the post–World War II paradigm of science policy as a whole, which has relied on definable and controllable sites of research and application. I trust that the Commission will address these issues. Here I want to call your attention to a different set of issues that may not be so evident, but that I nonetheless think are crucial and merit your careful attention and analysis.

In my work in bioethics and biotechnology, my concern has been with the worldview associated with and exemplified in synthetic biology—or, more precisely, in the elite representation and the social reception of synthetic biology. (Of course, that public representation and social reception is not always an accurate or complete account of what the science/technology actually is or does, as experts see it, but this public face of synthetic biology has enormous influence in its own right.)

My tack is to explore the source and shape of social concerns about biotechnology, especially from the vantage point of how this science and technology teaches us to think about natural systems, the relationship between humans and nature, and ourselves and our communities. Does it make us see ourselves as (in Aldo Leopold's words) "plain citizens of the biotic community"? Or as appropriators of meaningless raw biotic material? Does it teach us to see ourselves as civic trustees and stewards of a fragile and increasingly fragmented web of life? Or does it teach us to see ourselves as fabricators, improvers, exploiters, and engineers of a world that is imperfect precisely because it is very complex, fragile, and prone to eluding our deliberate control?

My general thesis is that biotechnology and synthetic biology do indeed convey civic and moral lessons—they have to, the notion of value neutrality in technology is a myth—and that the lessons they teach are the wrong ones. Not wrong necessarily in terms of the direct effects of the science within its still limited biological and operational range—I have nothing against growing microorganisms that can serve as clean fuel, or that can mitigate the environmental damage of oil spills—but wrong in terms of the indirect influence they have, in the ways in which the civic education offered by this science undermines the task of developing an alternative to the human appropriation, manipulation, and "engineering" of nature and of life. For it is an alternative vision and set of values—this change of worldview, this cultural evolution—that we must seek if we are to take seriously our goals of sustainability, resilience, and social justice. Green engineering fixes for specific problems will not get us there. (And besides, who can assure us that the technological outcomes of synthetic biology will all be green?)

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Another way to put this is that synthetic biology is a technology that may temporarily solve some *problems in* our lives, but it is also a cultural formation that will contribute, almost certainly, to the further distortion of the *patterns of* our lives. The sensibility that synthetic biology reflects will further impede our achievement of a crucial recognition for our future: I refer to the recognition that human beings are embodied, embedded, "natured" creatures, necessarily and fundamentally. We are not the engineers of life.

Now, are considerations such as this relevant and appropriate to policy-making in a pluralistic democracy? I would say yes, and all the more so because we are a democracy, or at least aspire to be such. Policy to govern science and technology that focuses exclusively on how the technology may harm us and that totally ignores considerations about how the meaning and culture of that technology may shape us is inadequate, one-eyed policy. Arguably, the civic and moral shaping of cultural meaning and worldviews are more important in a democracy than in other modes of governance. The frame used in the report of an earlier Presidential Commission on bioethics, *Splicing Life*, would discount and dismiss cultural concerns of the kind I am raising by saying that they really amount to a version of a religious objection to biotechnology.[2] This religious objection holds that synthetic biology is morally inappropriate because it is a form of "playing God." That is to say, it is a kind of human trespass into the sacred and a kind of sinful human arrogance. This criticism, defenders to biotechnology point out, is based on special metaphysical or theological beliefs that are out of place in the discourse of public policy analysis.

But this frame of response, which defenders of biotechnology have been using against critics for many years now, is totally inadequate for capturing the significance of the concerns I am trying to articulate here. Religious notions of the right relationship between humans and the creation certainly are one basis for concerns about biotic or ecological citizenship, trusteeship, and stewardship; but they are not the only basis, and it does not follow that these concerns are "religious" or metaphysical arguments. To think so is to overlook the ways in which these concerns are in fact grounded in the best science we have today as regards such fields as ecology, conservation biology, and geophysical fluid dynamics. To be a synthetic biologist is not to usurp the place of God (theologically a very bizarre notion, when you think about it), but it may well be to manipulate life in ways that are of dubious wisdom from a social and a scientific point of view.

To this one might respond: "Synthetic biology works, doesn't it?" Is the fact that something "works" the final determinant of its scientific legitimacy? I don't think so, any more than it is the final determinant of ethical legitimacy. Synthetic biologists have hit upon a level of genomic and biological functioning (at very elemental and small levels) that they can seemingly control rather impressively. So synthetic biology does "work" in a sense and therefore represents scientific discovery of a new truth in the biological sciences. Any yet, despite this, I have a feeling that synthetic biology's manipulations are profoundly out of step with the current best thinking in biology in that they seek to dispense with, rather than to understand, the complexity and holistic properties of biological systems at all levels. [3]

"The sensibility that synthetic biology reflects will further impede our achievement of a crucial recognition ...that human beings are embodied, embedded, "natured" creatures, necessarily and fundamentally. We are not the engineers of life

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I acknowledge that these reflections do not entail a set of specific and particular regulations concerning the future conduct of synthetic biology. But perhaps it is only one part of the task of the Presidential Commission to suggest regulation; another part of that task may be to warn against misplaced technological promise and subtle misdirection.

Bruce Jennings is Director of Bioethics at the Center for Humans and Nature and is Editor of Minding Nature. This article is adapted from comments he submitted to the Presidential Commission on November 8, 2010.

NOTES

1. B. Jennings, "Enlightenment and Enchantment: Technology and Moral Limits," *Technology in Society* 32 (2010): 25-30; B. Jennings, "Interpreting the Social Meaning of Biotechnology," *Minding Nature*, 3, no. 2 (August 2010): 45-47; B. Jennings, "Biopower and the Liberationist Romance," *Hastings Center Report* 40, no. 4 (2010): 16-20.
2. President's Commission for the Study of Ethical Problems in Medicine and in Biomedical and Behavioral Research, *Splicing Life* (Washington, DC: U.S. Government Printing Office, 1983).
3. D. Noble, *The Music of Life: Biology beyond Genes,* (New York: Oxford University Press, 2006).

CHN BOOKSHELF

A regular feature calling attention to important books and articles that CHN staff, board, and collaborating scholars are reading and recommend. *Quot libros, quam breve tempus.*

W. N. Adger, J. Paavola, S. Huq, and M. J. Mace, eds. *Fairness in Adaptation to Climate Change*. (MIT Press, 2006).

M. T. Brown, *Civilizing the Economy: A New Economics of Provision*. (Cambridge University Press, 2010).

Denis Dutton, *The Art Instinct: Beauty, Pleasure, and Human Evolution*. (Bloomsbury Press, 2009).

N. Scott Momaday, *The Man Made of Words*. (St. Martin's Press, 1997).

K. M. Sayre, *Unearthed: The Economic Roots of Our Environmental Crisis*. (University of Notre Dame Press, 2010).

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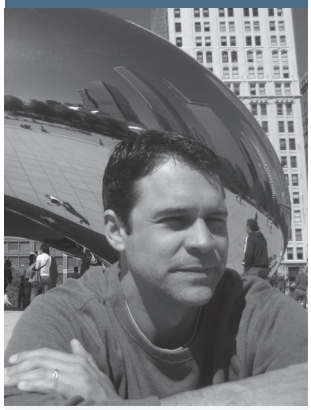

gavin vh

CONNECTING WHY TO HOW

ETHICS IS NOT A LUXURY—SO ENVIRON-mental ethicist Michael Nelson emphatically reminded those attending the inaugural Chicago Regional Forum on Ethics and Sustainability last October. Nelson noted that ethical discourse on decision-making—the (frequently unstated) "ought to's" of policy, law, science, economics, and so forth—most clearly emerges during challenging times and is an inescapable part of being human. Do it well or do it poorly, but all people live, move, and have their being in an ethically charged world.

The more remarkable reality may be that so many persons with concerns about the natural world don't often pause to collectively reflect on how our actions embody ethical commitments, and what can be done to bring these actions into alignment with our beliefs. The Chicago Regional Forum on Ethics and Sustainability was organized as an attempt to address this gap and to consider how we might engage others in our communities on the level of shared values and challenges. While there are too many highlights from the Forum to try to recap them all here, I'd like to distill a handful of notable themes that emerged. (Videos of each of the speakers' talks can be viewed on the Center for Humans and Nature Web site: www.humansandnature.org.)

As we were organizing the forum, anthropologist Alaka Wali raised a concern that struck me as critically important. To paraphrase, she said that she hoped the conference would not focus only on the moral reasons of *why* we should care about the natural world, but *how* we go about caring. The implication, with a healthy infusion of Chicago can-do spirit, was something along the lines of "Let's not waste energy pontificating to the choir. Let's get down to the business of making it happen."

The speakers we invited to this year's Forum were persons who all have the enviable ability to clearly express their sense of connection to the natural world, articulating deep feelings of *why* we should care. Four of our speakers were contributors to the recently published anthology *Moral Ground*, which is discussed more fully by Moore and Nelson's article in this issue. It is a book that is framed by the question, "Do we have a moral obligation to take action to protect the future of a planet in peril?" In the book, that question is answered in the affirmative by over eighty different luminaries from around the globe.

I don't think Alaka intended to discount the value of *why*. However, as she was so keen to point out, life is lived off the page—sometimes away from the support of people who think alike about land health, the needs of other species, and the rights of future generations to live in a beautiful and well-loved world. The real, everyday work that we do inevitably runs up against the particular challenges of *connecting why to how*.

One of our invited speakers, community activist Michael Howard, provided a sense of these challenges. About fifteen years ago, concerned about high lead levels in the soil and general blight in the area, Michael began a project to transform Fuller Park, his south Chicago neighborhood. This was no small task. In a vacant lot—which had been used as an

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illegal dumpsite for many years—Michael and his crew began to clean up and create what eventually became Eden Place Nature Center. Given such neglect and abuse of the land, the transformation has been remarkable—Eden Place is now a restoration site and an active urban garden, echoing with the laughter of children and the clucking of chickens.

On the day the forum began, Michael and I had a cup of coffee together before others arrived. I asked him some questions about his work. After we were well dosed with our morning caffeine, Michael told me, in passing, that his house had been firebombed once, then continued talking. Startled, I put down my cup and asked him to explain. Michael told me that his plans for the revitalization of Fuller Park initially met with some resistance from local gangs, especially the jobs-extension program he helped manage. In short, Michael was siphoning off the labor force of drug-dealers in the area by providing career alternatives. He posed enough of a threat that he became the target of intimidation tactics, including the firebombing.

> “...high-profile, controversial conservation issues don’t have a lot of traction in people’s hearts and minds if they are not grounded in a tangible place.

What would give someone like Michael the strength to continue despite such dangers to himself and his family? Disquieting benchmarks of 385 ppm of CO_2? Statistical analyses regarding biodiversity loss? Well-reasoned arguments about consequentalist ethics or the intrinsic value of Cerulean warblers? Probably not.

This speaks to why we chose to hold a “regional” forum and invited local conservation leaders to share from their experiences. Given that the ethical dimensions of conservation cut across various geographical boundaries—the international scope of climate destabilization being perhaps the foremost contemporary example—regional concerns may seem less worthy of attention. However, something that was affirmed during the forum was that high-profile, controversial conservation issues don’t have a lot of traction in people’s hearts and minds if they are not grounded in a tangible place.

What does it mean to “ground” ethics in place? My hunch is that most of us understand international issues, if and when we think about them, with reference to our everyday relationships. In other words, place provides the baseline and meaning for our experiences of the world, for our understanding of why these issues matter, and for how we might actually do something, however modest, about them.

It is no mistake, therefore, that many of the forum speakers and participants shared their unique stories of place. One remarkable participant, Sherry Williams of the Bronzeville Historical Society, spoke about how her vision of a walkable community in the Pullman District of Chicago inspired her to organize local birding excursions for her neighbors—with a twist. Because of its proximity to Lake Michigan, Chicago is a migratory flyway for many bird spe-

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cies. Chicago also has a remarkable legacy of human migration. Sherry lives in a predominantly African American community, a place that was a primary destination from the 1890s to the 1950s for blacks who left the rural south for opportunities in Chicago during a movement known as "The Great Migration." Sherry has taken this heritage and used it as a point of contact in understanding and generating interest about the birds that pass through her neighborhood. The response has been remarkable, and on Sundays, she told us, she now finds different waves of people waiting on her porch for these birding walkabouts.

Sherry is showing how culture and nature can be—as they have been for millennia—intertwined through narrative. Indeed, in some ways the distinctive power of the forum was captured by conservation writer Scott Russell Sanders during his talk when he remarked, "Place is geography soaked with stories."

Scott told a memorable story of his own. He recalled a time during his boyhood when his dad took him out into the woods, and with all earnestness, introduced him to an individual tree by having him feel its bark, look at its shape, and hold and smell its seeds. "Scott," his dad said, "this is Black Walnut; and Black Walnut, this is Scott." Scott's story highlights another theme that emerged during the forum: the cultivation of empathy. As a child, Scott probably did not think of his introduction to Black Walnut as an introduction to interspecies empathy; nevertheless, his dad was offering him a way of being, a way of seeing, based on empathy: a profound recognition of the presence and uniqueness of others who share this interconnected world with us.

The "No Child Left Inside" movement is one way to reach young people, allowing them the structured and unstructured places they need to stoke their curiosity and connect to the natural world, and this was much spoken about at the forum since one of our topics was "place-based education." But it was wildlife biologist John Vucetich who provided the most sustained (and perhaps most surprising) reflections on what he called an "ethics of empathy."

John argued that the scientific paradigm that has dominated Western thinking for the last four hundred years is in need of an overhaul. Unfortunately, conquering and controlling nature—forcing her to reveal her secrets, in the infamous words of the "father" of science, Francis Bacon—persists as a thought paradigm despite indications of strain. John's call to scientists, and his general prescription for fostering ethical human-nature relationships, was to embrace as the primary purpose of science an "ethics of empathy," the skill of understanding the perspective of an Other as a means of generating what he called "wonderment."

For John, this understanding had a very specific, almost revelatory, origin. John has been a field researcher on wolf-moose population dynamics for over two decades. Relatively recently, however, he came to the conclusion that his knowledge had been severely limited by his scientific methodology. Though considered a world expert on moose, and despite his many contributions to the study of moose behav-

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ior and ecology, he realized, "I had no idea what it is like to be a moose." His life has since become a meditation on what it is like "to be a moose," which has generated a series of little connections to other animals, which in turn led to lifestyle changes because he understood better the impact of his choices upon these creatures. His last encouragement was to find any creature that lives close—a house sparrow or a grey squirrel, for example—and meditate on that creature for a year.

What is it like to be a moose? You may trade the word "moose" for your own totem animal, vegetable, mineral, or ecosystem. The point is, empathy that generates "wonderment" may be the key to any environmental ethics or sustainability movement worthy of the name.

Cultivating an ethics of empathy points to the reality that sustainability is not reducible to individual lifestyle changes. Humans are not hermetically sealed individuals, airtight containers of thoughts and emotions that move along a cosmic conveyor belt toward their final destinations. Humans are porous, transactive creatures, from the food we eat to the air we breathe to the water that circulates through our bodies. Ultimately, an empathic ethics recognizes and cultivates the links between humans and nature, necessarily raising the question of collective flourishing.

"Ultimately, an empathic ethics recognizes and cultivates the links between humans and nature, necessarily raising the question of collective flourishing.

The tasks before us, of course, are magnificently large. As one participant put it, the human-earth relationship is akin to a "collective trauma," in which we have been un-settled, like hipbones from their sockets. In the why to how equation, the *how* is the messy part. This *how* is really about the joys and struggles of building community. This is when the *whys* we carry around in our heads meet the real, sometimes painful, always complex process of *how* we practice our convictions with others.

Healthy communities aren't about one-size-fits-all solutions, top-down pronouncements, or decrees from an enlightened elite. They require people deeply committed to work with others for a common good. People who know that psychologically, socially, and spiritually, we are dependent on natural systems. People who understand that process is as important as product. People who realize that relationships—with other humans, with the natural world, with the places we call home—provide the tensile strength that holds us together when confronted with forces that fragment our neighborhoods, our communities, and the land.

Sustainability has been defined in many ways in political documents and academic literature. The purpose of the forum was not to add one more definition to that stew. The forum *was* intended to highlight that sustainability means little without embracing its moral and relational dimensions. The forum reminded me that the intersection of ethics and sustainability lies somewhere in

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the realm of what anthropologist Laura DeLind has referred to as "sweaty sacrifices." The words sacrifice and sacred are etymologically related. It may be common to think of the sacred as something that drops from the sky, or some *mysterium tremendum* that overwhelms us and sends a shiver down the spine, like the grandeur of a prairie thunderstorm. I find Kiowa author N. Scott Momaday's perspective on the sacred more compelling. Momaday argues that particular places are *made* sacred. The sacred is *earned*—literally with blood, sweat, and tears—and, he hastens to add, with joy, song, and story, "offerings of life and death." Sweaty sacrifices. We become bonded to others, to the land, to our places by giving—deeply—of ourselves. These places are valuable because we have become part of them, physically and mentally, not just by "spending" time on them but by dwelling in and with them. We earn the right to live in such places.

It would be nice to have ethical panaceas. What we've got is a place. The forum was an opportunity to think about, and see living examples of, our remarkable place in the greater Chicago region. Reconnecting to place and one another through shared stories, collective struggle, and an ethics of empathy may not give us clear prescriptions. But we can be confident that sustainable cultures are those that are built through "sweaty sacrifices." The forum provided a venue to foster such connections—between people and place, between knowledge and empathy, and between why and how.

Gavin Van Horn is Director of Midwest Cultures of Conservation at the Center for Humans and Nature. The Center for Humans and Nature and the Chicago Botanic Garden co-sponsored the Chicago Regional Forum on Ethics and Sustainability, held on October 29 at the Chicago Botanic Garden in Glencoe, Illinois.