

PERC REPEATS

FOR FREE MARKET ENVIRONMENTALISM

**CROPS MINUS
SUN AND SOIL**

**THE CONSERVATION
ROAD LESS TRAVELED**

**ENVIROPRENEUR
SNAPSHOTS**

**MUD PEOPLE AND
SUPER FARMERS**



**10 YEARS OF
ENVIROPRENEURS**



PERC

The Property and Environment Research Center is a nonprofit institute dedicated to improving environmental quality through property rights and markets.

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“Every private sector entrepreneur has this incredible bias toward letting enlightened self-interest pull things along, and I fully believe this will happen,” says Gregg Carr who is creating a national park in Mozambique (page 38). Carr is finding that the fastest way to solve most environmental problems is with “economics not public policy”—a concept that PERC’s Enviropreneur™ Institute (PEI) has been teaching over the past 10 years. In this year’s special enviropreneur edition, PEI director emeritus extraordinaire, BOBBY McCORMICK, reflects on the past and future of this powerful program.

For ERIC KIHU, PEI class of 2010, the problem is the disappearing populations of black rhino and bongo antelope in Kenya. The economic solution: a motorsport race that attracts not only a bold batch of off-road warriors but also substantial financial resources for wildlife conservation.

Traveling west from Kenya, author G. PASCAL ZACHARY goes deep into Uganda to tell a tale of entrepreneurial villagers. One such villager, Ken Sakwa, lacks land titles but that hasn’t stopped him from creating contracts, leasing land, and building a farming enterprise. Zachary views such developments as an important journey toward property rights.

JOSH HOTTENSTEIN, CEO of Verdant Earth Technologies and PEI class of 2010, is busy transforming shipping containers into sun-free, soil-free, pesticide-free farms. For Josh, it’s all about getting the most out of limited resources. With no soil, Verdant can grow a head of lettuce with one percent of the amount of water used to grow lettuce in a traditional field.

But as demonstrated by CORY CARMAN, class of 2008, enviropreneurs are finding ways to keep the old fashioned farm alive and well. Carman’s ranch is discovering how the efficiencies of the large-scale food system, which once threatened to put many traditional family farms out of business, might be a mid-sized farmer’s best bet. The USDA refers to such farms as the “the disappearing middle.” Journalist SETH ZUCKERMAN explores agricultural easements as another path to “protect habitat for farmers.”

Turning to eco-fashion, SUMMER RAYNE OAKES, class of 2010, had her work cut out for her educating fellow enviropreneurs about fashion in Bozeman, Montana, where couture is chunky-heeled hiking boots paired with a puffy down vest. Summer is co-founder and CEO of Source4Style. “When it comes to what we wear, we seldom consider how it affects the natural, cultural, and economic world around us,” she writes. Source4Style is creating an online marketplace allowing designers and brands to search and source eco-friendly materials and services from a network of global suppliers.

CHRIS CORBIN attended PEI in 2008 as a Big Sky Brewing Company marketing man with an idea for a water marketing start-up. Today, his company, Lotic LLC, has completed 30 water rights consulting projects across 18 states. Lotic’s work focuses on the confluence of economic prosperity and resource conservation, or as Chris puts it, “where blue turns into green.”

PERC has learned a great deal from the nearly 200 enviropreneurs who have visited PERC University. I hope you get a taste of their inspiration from this fifth annual enviropreneur issue. Also, please be sure to visit PERCREPORTS.ORG to watch video footage accompanying many of the articles and to make an annual contribution—ensuring your subscription to *PERC Reports* stays active.

Laura E. Huggins

Laura E. Huggins | EDITOR

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More online at percreports.org

Hottenstein on TEDx, footage of flip-flop artwork, interviews of the authors, and much more



Thank You



RONALD COASE

Nobel laureate Ronald Coase recently celebrated his 100th birthday. What an impact his career and long life have had on PERC and free market environmentalism! Although Coase's seminal article on "The Problem of Social Cost," published in 1960, scarcely had a word about natural resources and the environment, its focus on property rights is the cornerstone on which markets are improving environmental quality.

In that article, Coase emphasized that well defined and enforced property rights encourage bargaining that can resolve conflicting resource uses. For example, his insight implies that an energy company wanting to drill for oil in sensitive wetlands owned by an environmental group could bargain with that organization to get permission to drill. Indeed, bargaining between the Audubon Society and energy companies was one of the first examples of free market environmentalism discovered by PERC fellows. As Richard Stroup noted in the 30th anniversary issue of *PERC Reports* (Summer 2010), "the oil companies and Audubon found common ground and entered into agreements," which used new drilling technologies, set seasonal limits on when drilling could occur, and earned royalties for Audubon.

Water markets to increase instream flows are another example of how Coase's ideas apply to the environment. In 2006, for example, the Oregon Water Trust (OWT) entered into an agreement with a third-generation ranching family, Pat and Hedy Voigt, who agreed to permanently shorten their irrigation season. By purchasing some of the Voigt's rights to divert water, OWT was able to keep 6.5 million gallons per day in the John Day River

in the late summer when the last and largest remaining populations of spring Chinook salmon and summer steelhead needed it. Such water marketing based on clearly defined water rights is the theme of a forthcoming book, *Tapping Water Markets*, by PERC research fellows Brandon Scarborough, Reed Watson, and myself.

Despite the success of OWT and other environmental groups that heed the lessons of Coase, some economists continue to follow the legacy of British economist A. C. Pigou (1877–1959), considered by many to be the father of market failure arguments. Modern day Pigouvians believe that when markets fail to account for all of the costs associated with market transactions, they can be corrected by government regulations, taxes, or subsidies. This view is illustrated by an anonymous review of the aforementioned book, which argued that the Oregon Water Trust example was overly simplistic and that "[t]he same allocational result would be achieved if the old ranch family had had to pay the State to divert its water, and could stop paying by releasing it—a Pigovian solution, in effect, wholly market-oriented in its logic."

A careful reading of Pigou, however, reveals that he probably would not have seen the conflicting demands

for John Day River water as a market failure, let alone called taxing water use as a “market-oriented” solution. Writing in 1932, Pigou argued that market failure might occur if “payment cannot always be exacted from the benefitted parties or compensation enforced on behalf of the injured parties.”

He thought that the inability to exact payment or enforce compensation would be due to a “technical difficulty,” or what Coase would call high transaction costs. A technical difficulty might exist if property rights are not clearly specified, but this was not the case for the OWT trade or similar examples of successful free market environmentalism.

On the other hand, a failure to recognize existing property rights can raise transaction costs or create technical difficulties. This happened when several environmental groups brought suit against Los Angeles to stop its diversion of water from the Owens Valley, arguing that the city’s water rights were trumped by the state’s responsibility to maintain the environmental quality of Mono Lake. Though the environmentalists “won” the suit in 1983, it was more than a decade—and millions of dollars spent on legal fees—before diversions were reduced and water was flowing into Mono Lake (see *PERC Policy Series*, No. 33). An enviropreneur would have taken a different approach. He or she would have recognized Los Angeles’ water rights and bargained with the city to reduce diversions.


Despite the presence of technical difficulties or high transactions costs, enviropreneurs have a long history of creating solutions to environmental problems that modern day Pigouvians would say could only be solved by the government. Enviropreneurs lower the transactions costs, establish and recognize property rights, and create market-based, Coasian solutions.

Those of us who want to improve environmental quality through markets and property rights wish Professor Coase a belated happy birthday and, more importantly, thank him for giving us the intellectual foundation on which free market environmentalism is built.


In “On Target,” PERC’s executive director Terry L. Anderson confronts issues surrounding free market environmentalism. He can be reached at perc@perc.org.

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ENVIROPRENEURS ACROSS THE GLOBE

Ten years ago, PERC embarked on a journey that would indelibly impact the lives of many environmentalists, as well as the face and direction of our organization. The idea was borne out of PERC's passion to bring management principles, economics, property rights, and markets to the environmental movement. PERC's Enviropreneur™ Institute, formerly known as the Kinship Conservation Institute, is the embodiment of that vision and is now entering its eleventh year. The breadth of interests and organizations represented in the ten incarnations of the Institute show a dedication and purpose to environmental conservation and liberty not likely equaled anywhere else in the world. Indeed, the sun never sets on the Enviropreneur Empire!

As the retiring director of the Institute, it seems an appropriate time to reflect on the past and future of this high-energy, hands-on, and often life-changing program. But first thing's first: What exactly is an enviropreneur? It is an entrepreneur who makes environmental assets out of environmental problems. An enviropreneur sees an opportunity where others see waste. An enviropreneur sees a chance to do well while doing good. But how does this all come about?

10

YEARS OF ENVIROPRENEURS

BY BOBBY
MCCORMICK



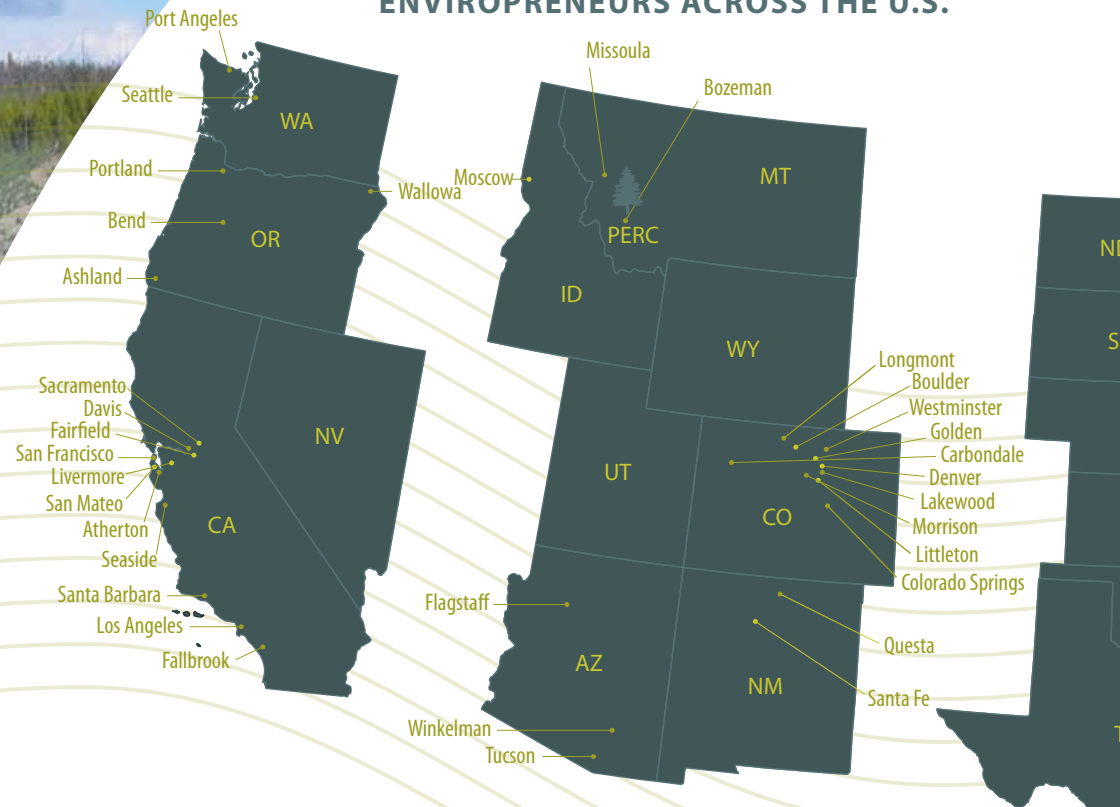
WELCOME TO MONTANA

So you have spent the past 15 years working a somewhat, but not completely, satisfying job for an environmental organization, when suddenly, you find yourself in Bozeman, Montana, with some group called PERC. Here you greet your fellow enviropreneurs, and before you know it, you're in a van heading toward the Gallatin Mountains. You are stunned by the simple beauty of the green landscape and the stark contrast of snow-capped peaks in all directions. "Is this real?" you ask yourself, as if the 5,000 foot elevation has you seeing things.

You head into a canyon that looks like a movie set from *A River Runs Through It*. You cross the Gallatin River and veer off onto a dirt road—your second thoughts turning to thirds and fourths. You crest a hill to find hundreds of bison roaming on a field of green that runs for miles until it hits the sky. You are now on Ted Turner's 114,000-acre Flying D Ranch.

It is here, at a place called Cow Camp, where you spend the next four days with 15 other enviropreneurs, many of whom you develop relationships with that will last your entire career. You rise early to scope for elk, participate in one-on-one discussions with other environmental entrepreneurs, listen to lectures from an array of environmental scholars and business leaders, and take part in honest discussion with your peers on how to make environmental entrepreneurship a reality. As night falls, you crash in your bed as the coyotes howl nearby.

ENVIROPRENEURS ACROSS THE U.S.



GOING PUBLIC

The four days at the Flying D end as quickly as they began, and the learning now shifts from a private version of the park—“Ted’s Yellowstone”—to the public version. You head to Yellowstone National Park with your tour guide and enviropreneur extraordinaire, Hank Fischer. Hank is the former manager of the wolf compensation fund for Defenders of Wildlife. You hear the inspiring story of how his group raised funds to compensate landowners for livestock losses due to wolves. His story turns the learning, lectures, and discussions into something real, and you begin to grasp what it means to be an enviropreneur.

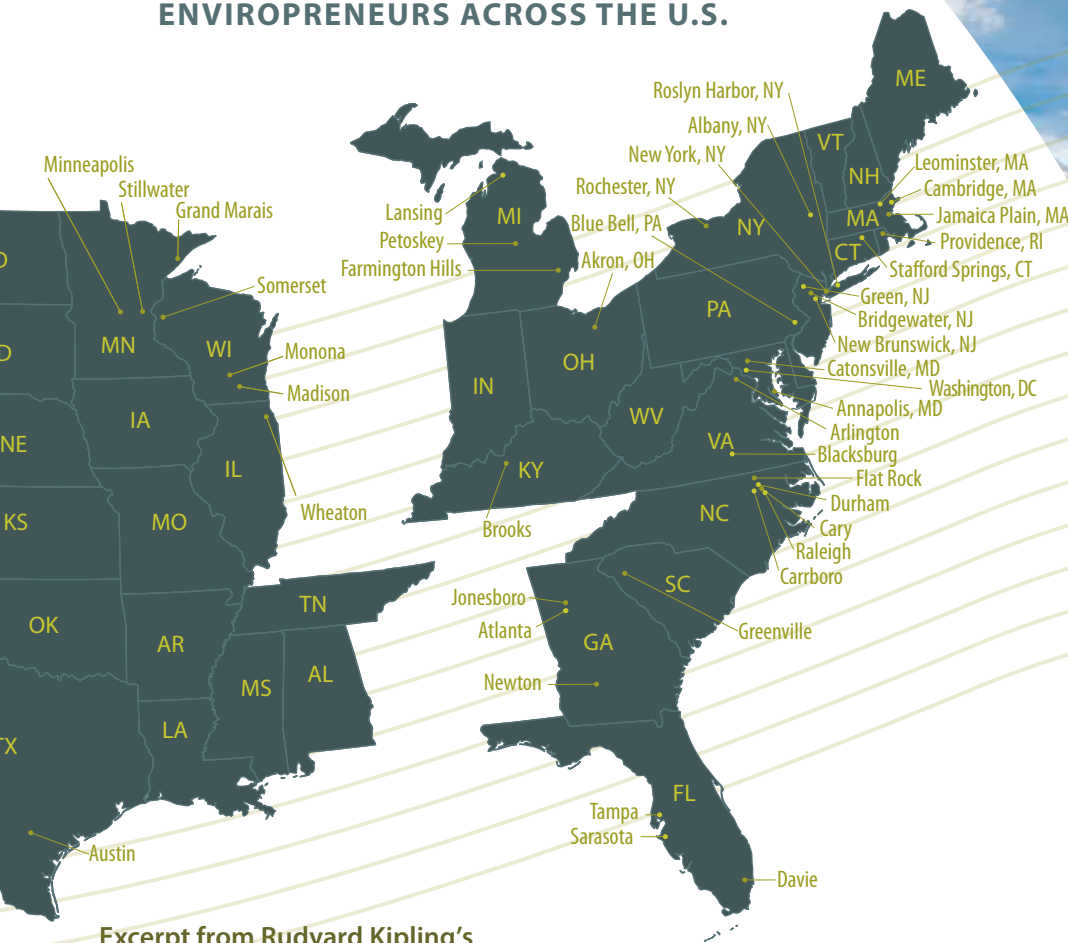
The next seven days are spent back in Bozeman working with such folks as a former president of Ogilvy Mather, a senior partner at Accenture, the president of the Searle Freedom Trust, the managing director of an angel investing group, a host of world-class university professors, and former enviropreneur fellows who come to tell their stories. You talk, you listen, you think, you ponder, you question, you are mentored, you mentor, you “epiphanate”—a term created by Kathy Viatella (class of 2001) to epitomize the open mindedness of the Institute.

It all ends too soon. Tired to the bone, but full of fresh ideas, you are now armed with new tools and knowledge, several lifelong friends and colleagues, and an even deeper affection for the environment. You are an enviropreneur.



Enviropreneurs spend four days at the Flying D Ranch—a Turner Enterprises property. The ranch focuses on bison management, wolf observation, and the reintroduction of westslope cutthroat trout.

ENVIROPRENEURS ACROSS THE U.S.



Excerpt from Rudyard Kipling's
The Jungle Book:

*In the cage my life began;
Well I know the worth of Man.
By the Broken Lock that freed—
Man-cub, ware the Man-cub's breed!
Scenting-dew or starlight pale,
Choose no tangled tree-cat trail.
Pack or council, hunt or den,
Cry no truce with Jackal-Men.
Feed them silence when they say:
"Come with us an easy way."
Feed them silence when they seek
Help of thine to hurt the weak.*

*Make no bandar's boast of skill;
Hold thy peace above the kill.
Let nor call nor song nor sign
Turn thee from thy hunting-line.
(Morning mist or twilight clear,
Serve him, Wardens of the Deer!)
Wood and Water, Wind and Tree,
Jungle-Favour go with thee!*

LAW OF THE JUNGLE

The Institute is usually opened with an excerpt from Rudyard Kipling's *The Jungle Book*, but I use it now to close, hoping it embodies the ideas that lurk, subtly yet powerfully, 'neath the Institute. Perhaps it will inspire a future fellow to be a better conservationist, an enviropreneur, a recharged steward of all the bounty that has been tossed in your nest.

Enviropreneurship has been taking the environmental movement by storm, in large part due to the work of the Institute and the talented individuals who have gone through it. (See, for example, what some of our first crop of enviropreneurs are doing today in "Where Are They Now," page 11). While the Enviropreneur™ Institute has left its mark on the environment, it has had an even bigger impact on PERC. The program and its incredible lot of fellows have opened doors for PERC that could only have been wished for previously—arenas that were closed and audiences with no ears. A few years ago PERC changed its name from the Political Economy Research Center to the Property and Environment Research Center. The Institute is the embodiment of that change. This is PERC's Enviropreneur™ Institute.



EPILOGUE

Over the past 10 years, there have been a number of people who have played pivotal roles. The Enviropreneur™ Institute has been a team effort with roles mingled and tasks taken on by whoever was closest to the handle. Chief among those is Bruce Yandle, PERC senior fellow and dean emeritus of the business school at Clemson University, who had the original vision and fortitude to bring business ideas to the environmental movement. Another is Carol Ferrie, or as one fellow affectionately called her, “Mom,” who poured herself into every aspect and facet of the Institute. In addition, the many donors—including: the Alexander Foundation, S. D. Bechtel Jr. Foundation, Cook Ranches, D & D Foundation, the William H. Donner Foundation, Fieldstead & Co., Kinship Foundation, Claude R. Lambe Charitable Foundation, Fred Maytag Family Foundation, Ohrstrom Foundation, Oram Foundation, and the Randolph Foundation—whose sacrifices have made this feast possible, cannot be thanked enough. And finally, without the Searle Family, Terry Anderson, Wally Thurman, and the entire team of faculty giving tirelessly of their time and soul, this whole thing would still be just a dream.

Looking back, I see it’s truly been from “good to great.” As the Institute moves forward and continues to be a program that educates environmentalists to become enviropreneurs, I have no doubt that Kurt Schnier, PERC senior research fellow and associate professor of economics at Georgia State University, and Reed Watson, PERC’s director of applied programs, will masterfully lead the program into the future.



BOBBY MCCORMICK, PERC senior fellow, is the director emeritus of PERC’s Enviropreneur™ Institute. McCormick is professor emeritus of economics at Clemson University. He can be reached at sixmile@clemson.edu.

The lives of many and the face of PERC were forever impacted some 11 years ago when Bruce Yandle met with members of the Searle Family and their Kinship Foundation.

WHERE ARE
THEY NOW?**JOHN CHARLES**

Cascade Policy Institute

In 2004, John Charles became the president of Cascade Policy Institute—an Oregon-based think tank working for state-level reform in areas such as land-use regulation, energy, and taxation. John speaks and writes frequently about free market environmentalism. Currently, he is working on a series of case studies on Portland's transit-oriented developments. Over the past decade, John has made presentations on this topic in 27 states.

SEAN BLACKLOCKE

Independent Environmental Consultant

Sean Blacklocke lives in Dublin, Ireland, and Washington, D.C. and specializes in water resources management. Sean's largest contract is currently with the University College Dublin in Ireland, where he serves as project manager of a five-year multi-disciplinary study of forestry impacts on water quality. He is also chairman of a water quality trading workshop series sponsored by the International Water Association and supported by the Organization for Economic Cooperation and Development. The first two workshops were held in Seoul in 2009 and Québec in 2010. The final workshop will be in Rotorua, New Zealand, in September 2011.

NORMAN LOWE

EcoResults Institute

Norman Lowe has lived in Flagstaff for the past 21 years where he is the executive officer of a nonprofit environmental organization called EcoResults Institute. Over the past nine years, EcoResults has worked with ranchers and various agencies on land restoration projects. Norman has also published *Aesthetic Sustainability: The Fourth Bottom Line Orienting Sustainable Building and Development*, which highlights the importance of values and aesthetics in green development. Norman is currently writing children's stories and designing workbooks promoting green living and environmental awareness. Find out more at www.ecoreresults.org.

SHARON SAFRAN

Lockton Companies

In 2003, Sharon Safran opened Gudigwa Camp, a high-end bushman cultural village/safari experience in the Okavango Delta in Botswana. After earning a Master's degree in Environmental Sustainability from the University of Edinburgh in 2004, Sharon worked for the Global Environment Facility,

housed at the World Bank. In 2006, she moved to the United States and became an environmental underwriter, selling pollution insurance associated with brownfield redevelopments. Sharon is now an environmental risk specialist with Lockton Companies—the largest private commercial insurance broker in the world.

ELIZABETH SINGLETON

The Dow Chemical Company

Elizabeth Singleton founded the Tanzania Natural Resource Forum, an organization created to improve natural resource management in Tanzania. The organization is based on five principles: transparent governance institutions, a responsive policy and legal environment that supports land rights, profitable partnerships with rural landowners, accountable resource users and managers, and well-managed ecosystems that generate sustainable services. Find out more at www.tnrf.org. After completing her MBA at UC Berkley, Elizabeth joined the Dow Chemical Company, where she currently works as the global business development leader for Dow's Energy and Climate Change Group.

KATHY VIATELLA

Sustainable Conservation

Kathy Viatella is the managing director of programs for Sustainable Conservation, a nonprofit that advances the stewardship of natural resources using innovative, pragmatic strategies that engage businesses and private landowners. Her role is to manage programs and shape new initiatives that position the organization for continued growth. Previously, Kathy worked for the Nature Conservancy in San Diego developing and implementing strategies to conserve ecologically important habitats in Southern California. Prior to TNC, Kathy was an economist with the Environmental Defense Fund where she worked to create landowner incentives for the conservation of rare plants and animals.


TARA WOOD

Wildfitness

In 2001, Tara Wood founded Wildfitness, a company that offers physically transformative experiences in nature and promotes a philosophy for life-long health. Wildfitness teaches a range of natural human movements including bare-foot running, swimming, and climbing. Tara's role is to ensure that all components of the business—customers, staff, and the environment—are well serviced. In particular, her focus is to innovate and keep Wildfitness a leader in the field of natural fitness and health. Find out more at www.wildfitness.com.

Crops - [Sun + Soil] = CONTROLLED ENVIRONMENT AGRICULTURE

BY JOSH HOTTENSTEIN



WHAT SEPARATES CONTROLLED ENVIRONMENT AGRICULTURE FROM TRADITIONAL OR HYDROPONIC PRODUCTION METHODS IS THE DEGREE OF CONTROL THE GROWER HAS OVER THE CROPS.


In a world where only a quarter of all arable land remains viable for agriculture, where population is predicted to increase to nine billion by 2050, and where people are concerned with food safety, new methods of agricultural production are increasingly sought-after. At Verdant Earth Technologies, we are developing agricultural systems to address future challenges and to provide a growing population with fresh produce.

CONTROLLED ENVIRONMENT AGRICULTURE

Over the past 30 years, academic researchers have pursued the development of advanced technologies for environmental control of agricultural production. This

development, called “controlled environment agriculture,” has led to the refinement of greenhouse growing techniques that, when combined with hydroponic technology, give growers the unprecedented ability to control crop growth. These methods allow growers to produce crops year-round, creating substantial increases in outputs with fewer inputs.

What separates controlled environment agriculture from traditional or hydroponic production methods is the degree of control the grower has over the crops. By combining advanced computer controls, sensors, and analytical tools, Verdant can alter the flavor of its crops by changing the growing environment without perform-



VERDANT EARTH TECHNOLOGIES GROWS A HEAD OF LETTUCE WITH LESS THAN ONE GALLON OF WATER—AMOUNTING TO 1 PERCENT OF CONVENTIONAL AGRICULTURAL PRODUCTION METHODS.

ing genetic modification. This allows the grower to offer produce that tastes better to the consumer and to increase his or her bottom line.

Advanced computer controls also allow the grower to see substantive increases in crop yields. In a typical controlled environment, the grower will see yields increase up to ten times over what they are capable of growing in the field. For crops such as lettuce, Verdant is able to take 90-day crop cycles in the field down to 30-day cycles in a controlled environment.

The application of controlled environment agriculture methods allows for more efficient uses of resources. In a confined growing system, Verdant typically uses less than 10 percent of the fertilizer used in the field. We are able to achieve these results by precisely controlling what the crops receive at each stage of development and continually adjusting fertilization through the use of computer monitoring. Resource efficiency also extends to the use of minimal water for crop production. Lettuce, which is normally flood irrigated, takes 120 gallons of water to grow each head of lettuce in the field. Utilizing controlled

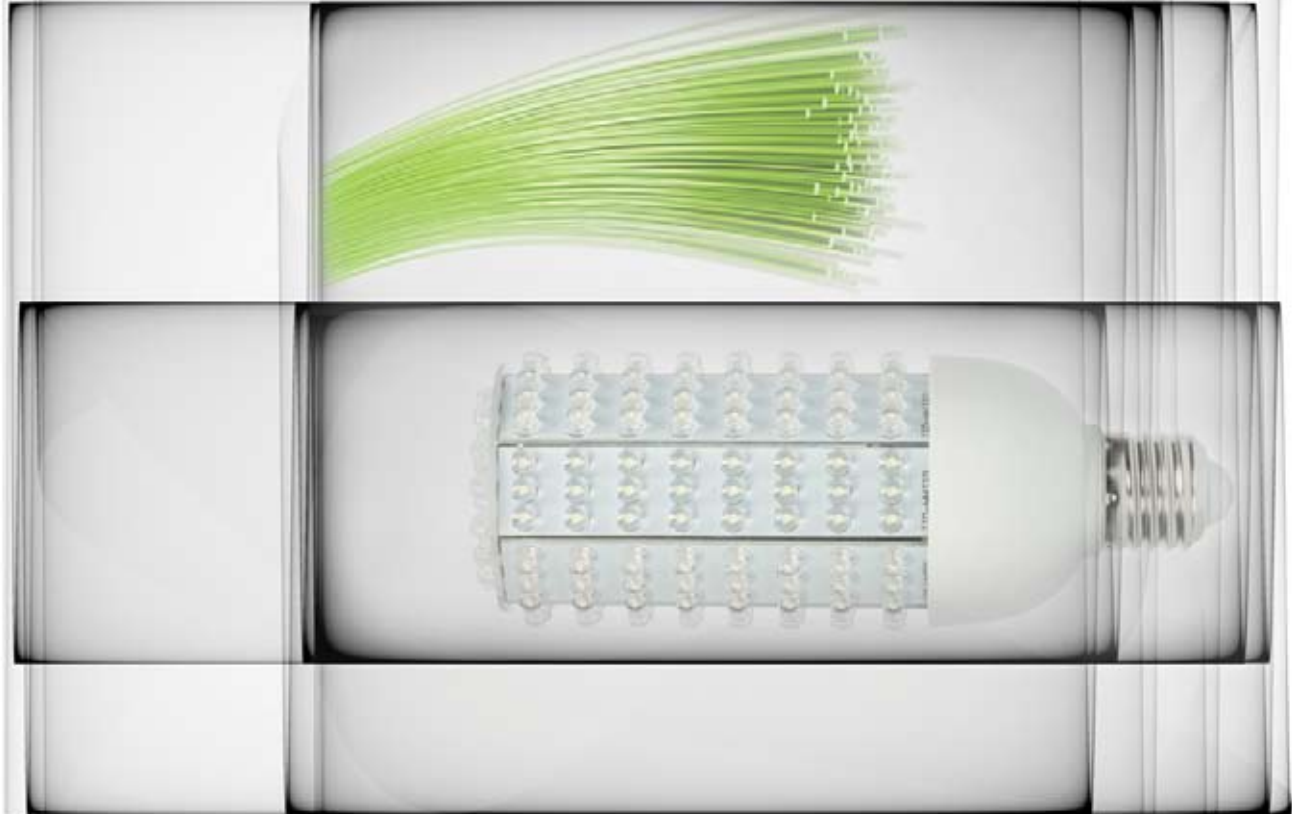
environment practices, Verdant grows a head of lettuce with less than one gallon. This means we are able to use less than 1 percent of the water of conventional agricultural production methods.

GROWING PLANTS WITHOUT SUNLIGHT

The technology associated with greenhouses and hydroponics has been advancing for the past several decades. But even in a greenhouse, there is still a high degree of risk related to lighting, temperature, and disease. This is why in the last several years scientists have developed completely enclosed and artificially illuminated methods of produce production.

The first non-research system for artificially illuminated food production was sent to the United States South Pole Station in 2004. The South Pole system provides the crew with fresh produce year-round independent of weather or outdoor conditions, replacing the greenhouses previously maintained at the station. The real benefits of this method come from the advanced illumination system. Utilizing special lamps, the plants

VERDANT USES DIFFERENT ARTIFICIAL LIGHTING OPTIONS, INCLUDING SOLAR CONCENTRATORS AND FIBER OPTICS TO DISTRIBUTE LIGHT FROM LEDs.



at the South Pole yield 50 percent more produce per square meter than the average North American greenhouse.

These developments in artificial illumination are also being used in Japan. They have invested US\$134 million in cleanrooms retrofitted with illumination systems and growing racks for the production of produce. Japan has more than 150 of these plant factories providing residents with fresh produce grown in dense urban environments.

SOLVING THE RIGHT PROBLEM

As with any new technology, it is important to be cautious. While there are substantive benefits to controlled environment agriculture, the methods are not appropriate for all crops or all situations. The technology must be appropriately applied to solve the correct problems in the food system. The application of this new growing method is most conducive to crops such as lettuces, herbs, peppers, tomatoes, and melons. These crops are of high value to the consumer and highly perishable in the grocery supply chain. Grain crops such as wheat, corn, and barley as well as orchard crops such as citrus, apples, and peaches

are generally not appropriate for controlled environment agriculture production.

Energy consumption remains an important factor in the application of controlled environment agriculture practices—especially with artificial illumination. This method can use considerable amounts of electricity. However, due to substantially fewer inputs, including water and fertilizer, combined with faster production times, Verdant's experience suggests that most growers are still able to double the profitability of their operations.

Furthermore, in the current environment, food safety remains a concern that can be effectively addressed through the application of selected controlled environment agriculture methods. Agriculture practitioners, whether in a greenhouse or a system with artificial illumination, maintain levels of cleanliness significantly higher than outdoor environments. In a greenhouse, growers regularly scrub walkways and growing systems are sterilized between crops. The automation in modern controlled systems allows for separation of the plants from human contact during the growing process—minimizing the potential for disease transfer.



VERDANT HAS A PLAN TO RETROFIT STANDARD 20-FOOT SHIPPING CONTAINERS INTO MINI FARMS.

A FARM IN A SHIPPING CONTAINER

Despite the advantages of controlled environment agriculture, this method has been slow to take off due to its complex nature. This is why Verdant is working on packaging this process with the latest information technologies to create a high-tech greenhouse inside a shipping container. In a container, similar in size to a semi-truck, we are able to fit five levels of growing areas within the vertical space while creating the same productivity of a 1,000-square-foot greenhouse. Containerization of the greenhouse with artificial illumination allows the growth of plants independent of location. So long as the grower has access to power and water, they are capable of producing up to 10,000 pounds of fresh produce annually. The addition of information technologies offers the grower a consistent operation even with little knowledge of the internal workings of the system—allowing for turnkey implementation.

The ability to mass produce highly efficient shipping container-based growing systems permits growers to examine new business models and reduce the risks

associated with produce production. By creating year-round production, growers are able to time the market to ensure they receive the best price for their crops. Risk is mitigated due to environmental control and illumination methods that allow the grower to deliver a known quantity and quality of produce at the exact time they wish.

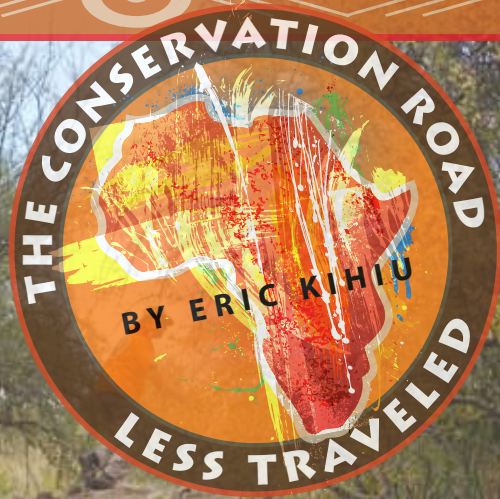
The efficiency provided by controlled environment agriculture practices may sound like science fiction. Yet serious scientific inquiry over the past 30 years has allowed Verdant to question fundamental premises and develop methods of efficiently growing plants without soil or sunlight.



Visit percreports.org to watch a video



JOSH HOTTENSTEIN is the CEO of Verdant Earth Technologies—a University of Arizona technology transfer project. Josh is a graduate of the 2010 PERC Enviropreneur™ Institute and can be reached at josh.hottenstein@verdantearthtech.com.



The Kenyan Rhino Charge is an off-road motorsport race held by Rhino Ark that attracts not only a bold batch of off-road warriors but also substantial financial resources for wildlife.

The mention of Kenya usually conjures up images of sandy beaches, wildlife safaris, and champion distance runners. It is a country of contrasts, with landscapes ranging from snow-capped mountain peaks to lush tropical forests and searing hot deserts. It is also a land rich in biodiversity and blessed with abundant wildlife.

Although Kenya enjoys a thriving wildlife-based tourism industry, the wildlife has faced grave challenges. Commercial poaching for ivory and rhino horns, subsistence bush meat hunting, and habitat loss due to human encroachment are among the major factors that have decimated many wildlife species. The black rhino and bongo antelope, in particular, have been pushed to the brink of extinction.

Much of this wildlife can be found in and around Kenya's protected areas, which include national parks and game reserves. These areas, however, make up only 8 percent of Kenya and are often located adjacent to farms, rangeland, and other forms of land used by local communities. Over the years, human-wildlife conflict and competition for scarce land have posed a significant challenge to effective wildlife conservation.

LOCALS BEAR LOSSES

The traditional conservation paradigm in Kenya has only exacerbated such challenges. Wildlife belongs to the State, regardless of where it is found, and the revenues earned from wildlife viewing accrue to the State, not the neighboring communities. Local villagers bear the impacts of human-wildlife conflicts, but receive little direct benefit in return. As a result, many communities have historically viewed wildlife as a nuisance and source of loss rather than as an asset.

Lying at the heart of Kenya's central highlands is the Aberdare Conservation Area (ACA). The ACA is a 2,000-square-kilometer mountain forest range surrounded by highly productive agricultural lands. Throughout the 1970s and 80s, regular crop destruction and the depredation of livestock built up much animosity toward wildlife in the neighboring villages. In addition, illegal activities including poaching, livestock grazing, and logging in the ACA have had detrimental effects on wildlife and the habitat on which it depends for survival.

The black rhino—known globally as one of the most critically endangered species—was poached relentlessly as a result of the rising demand for rhino horn in Asia and the Middle East. The State seemed unable to act decisively or in good time. Something different had to be done.

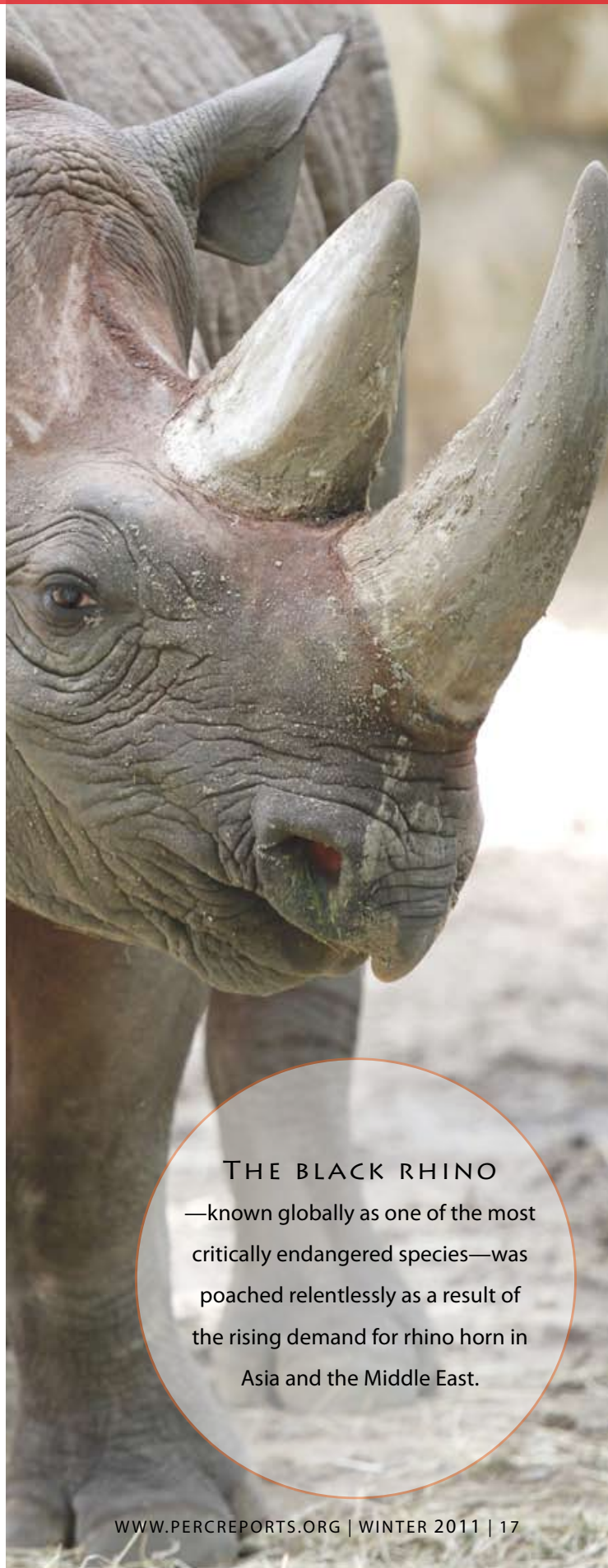
FENCING FOR WILDLIFE

Rhino Ark, a nonprofit charity, was formed in 1988 to tackle this crisis. Its goals were twofold: resolve human–wildlife conflicts and actively engage local communities in the conservation process.

A radical solution was envisaged: construct a game-proof electric fence around the entire ACA. The two meter-high, 400-kilometer-long fence would contain wildlife within the protected area’s boundaries on the one hand, and it would act as a physical deterrent to human encroachment and illegal activity on the other.

For more than two decades, Rhino Ark has been making this vision a reality. Through a seminal private–public partnership with the government, along with aggressive fundraising, advocacy, and community engagement efforts, Rhino Ark has introduced a new conservation paradigm to Kenya—one that recognizes the role agricultural communities play in conservation efforts. For example, local conservation units were established or supported by Rhino Ark in order to assist government agencies in carrying out wildlife surveillance activities. One such group, the Bongo Surveillance Unit, is now instrumental in highlighting the plight of the critically endangered bongo antelope—a species endemic to Kenya, with fewer than 100 individual animals thought to still exist in the wild.

Rhino Ark also provides seed money and logistical support for the creation of community-based micro-enterprises such as tree nurseries and has worked with nearby villages to restore degraded indigenous forests in protected areas by replanting trees. In addition, Rhino Ark sponsors study visits to other areas to introduce communities to alternative income producing activities, and has educated locals on conservation practices through school programs. These initiatives help Rhino Ark achieve its goal of expanding support among locals for the integrity of the ACA’s ecosystem.



THE BLACK RHINO
—known globally as one of the most critically endangered species—was poached relentlessly as a result of the rising demand for rhino horn in Asia and the Middle East.



THE BONGO ANTELOPE

is a species endemic to Kenya with fewer than 100 individual animals thought to still exist in the wild.

CHARGING FOR CONSERVATION

Building both a fence and ensuring lasting benefits for the local communities that live along it are not cheap. Thus far, US\$10 million has been raised, with funding for the fence provided primarily by the Kenyan Rhino Charge—an off-road motorsport race held by Rhino Ark that attracts not only a bold batch of off-road warriors but also substantial financial resources. Up to 60 teams compete in the annual event, pledging sponsorship funds to secure their entry into this prestigious competition.

The winning team is the group who travels the least amount of distance to complete the course. The outcome, as described by *Auto Life Quarterly*, is a race “combining the camping of an outdoor concert with the tailgating of a NASCAR event in the beautiful wilderness that can only be found on the African continent.”

The race is carefully designed to challenge both man and machine while respecting the integrity of the environment. The location changes every year and remains a secret up until the start of the race. The findings and recommendations of independent expert environmental assessments are used to eliminate or mitigate any potential ecological impacts.

From humble beginnings 22 years ago, Rhino Charge now raises up to US\$1 million annually for conservation. Friends of Rhino Ark overseas, Kenyans living abroad, and bilateral and non-governmental donors also support Rhino Ark’s work through donations and grants.

Such successful fundraising efforts have enabled Rhino Ark to ardently pursue its unique approach to conservation. Rhino Ark has facilitated research on flagship wildlife species, created public awareness of the value of mountain forest ecosystems and their biodiversity, and helped develop conservation-friendly enterprises. All of this depended on improving the livelihoods of those living near protected areas and reducing their dependence (illegal or unsustainable) on protected area resources.

After 21 years of work, the construction of the Aberdare fence was completed in August of 2009. The focus is now on long-term maintenance of the fence and management of the ecosystem it protects. As a result of the successful conservation efforts in and around the ACA, the Rhino Ark model has been hailed as a blueprint for public-private partnerships that can be replicated in other ecosystems facing similar challenges.

SCALING UP

In December 2010, Rhino Ark announced a formal commitment to support conservation efforts in two other key mountain forest ecosystems; Mount Kenya and the Mau Range. These ranges face a host of conservation challenges.

Mount Kenya is a snow-capped 2,700-square-kilometer mountain forest that lies squarely on the equator. It is an ecosystem rich in wildlife. The Tana River, which supplies more than 40 percent of Kenya's electricity, draws much of its waters from this mountain. Yet the water flows have been greatly reduced over the years due to, among other factors, forest destruction and poor management of riparian areas.

Similar challenges face the Mau Range, the water source for the popular Masai Mara game reserve. Past governance weaknesses have resulted in the destruction of the Mau forest, diminishing its natural water catchment function and causing reduced river flows. Furthermore, both areas are strongholds of the bongo antelope.

Rhino Ark plans to bring its unique approach to conservation to these two areas. The Mount Kenya fence will be at least 400 kilometers long—about the same length as the Aberdare fence—at an estimated cost of US\$12 million. Subject to funding, the project could be completed within four years. The Mau project will require a fence of about 60 kilometers in length and cost about US\$1.2 million to construct.

The success of Rhino Ark has demonstrated the ability of local groups to address social and environmental problems in a way that formal governments alone cannot. Just a few decades ago, it would have been difficult to imagine such a strange collaboration of conservationists, villagers, and off-road racers working together to solve Kenya's persistent human-wildlife conflicts. The visionaries behind Rhino Ark have created benefits for both wildlife and local villages, while paving a new path for conservation in Africa.



ERIC KIHU, a 2010 PERC enviropreneur, is the resource development manager at Rhino Ark Charitable Trust. Before joining Rhino Ark, Kihiu served in a variety of senior management positions in the Kenya Wildlife Service. After completing his Bachelor of Commerce degree at Nairobi University, he worked in the insurance and oil industry sector. He can be reached at ekihiu@rhinoark.co.ke.



MOUNT KENYA
is a snow-capped 2,700-square-kilometer mountain forest that lies squarely on the equator. It is an ecosystem rich in wildlife.

Where's the grass-fed beef?

BY CORY CARMAN



Over the past few decades, a dichotomy has emerged in American agriculture. On one hand, large agribusinesses and their highly efficient processing and distribution systems bring affordable food to every corner of the country. On the other, small-scale farmers provide healthy, local food to an increasing number of consumers who value it. Our ranch in northeast Oregon lies somewhere in the middle.

The Carman family ranch is the same type of midsized farm that the USDA recently called “the disappearing middle.” The high transaction costs of selling directly to consumers make it difficult for producers like us to sell everything we produce to niche markets. At the same time, we can’t begin to compete with the efficiencies enjoyed by large corporate farms. Add to the mix a dependence on an increasingly volatile commodity market, and it’s no surprise that 150,000 midsized farmers have recently hung up their hats.

Despite these odds, my husband and I are beating the statistics. For nearly 10 years, we’ve been selling high-quality, grass-fed beef (free of hormones and antibiotics) to a growing number of Oregon families, restaurants, and businesses. In the process, we’ve found a way to com-

The efficiencies of the large-scale food system, which once threatened to put many traditional family farms out of business, might turn out to be a midsized farmer’s best hope.



The Carman family ranch is located in northeast Oregon.

bine profitability with sustainability. The key to our recent success has come from looking beyond the typical business plan of a small-scale farmer.

For several years, the Carman Ranch divided its sales channels between conventional commodity sales and direct marketing of grass-fed beef to individual consumers. Following the lead of small farmers, we made personal connections with our customers. Their support allowed us to develop production practices that not only made a positive impact on the landscape but also yielded exceptional beef. But in order to continue these practices, we needed a premium price for our product. We couldn't accomplish this by selling a few steaks at a time, so we looked beyond home kitchens and found customers who cooked in much larger venues.

By the time we began approaching businesses, we had the knowledge, credentials, and capacity to work with them. Customers initially came slowly, but as we further established our brand and built our reputation, interest in our product grew. Still, we were hampered by the high price of our beef. Our primary buyers, hospitals and universities, simply couldn't afford our meat. The problem was

clear: Working with a small processing plant, nearly 40 percent of our costs were incurred after the cattle left the ranch.

We knew that our ability to grow depended on finding new partners to process, transport, and distribute our beef. After many rejections, we connected with a meat distribution company that agreed to add our brand to their line of products. An unlikely partner, owned by one of the largest distributors in the country, this company took important steps to support the Carman Ranch by buying whole animal quantities and distributing a seasonal product—quite important with respect to grass-fed beef, but unheard of in conventional meat purchasing. The company also opened the door to a larger-scale and cheaper processing plant. The combination immediately lowered the price of our beef by 15 percent. Our sales took off, and in the first year, we could barely meet the new demand.

We made our exit from the commodity market by combining the

relationship-based marketing that allows small farmers to prosper with the efficient distribution and processing that gives large producers a pricing advantage.

Although our buyers serve thousands of meals each day, they still find time to come out to the ranch to see the careful management practices their purchasing supports. And even though we are their smallest product line, our distributor continues to alter its systems to support our growth. Our experience demonstrates how the efficiencies of the large-scale food system, which once threatened to put many traditional family farms out of business, might turn out to be a midsized farmer's best hope.



Visit percreports.org to watch a video



CORY CARMAN, a 2008 PERC Enviropreneur alum, was raised on the Carman Ranch where her family has lived since 1913. After studying at Stanford University and working in Washington, D.C. and Los Angeles, she returned to rural Oregon in 2003. She can be reached at cory@carmanranch.com.

Turning blue *into green*

BY CHRIS CORBIN



Water is the lifeblood of the arid West. Because of its importance, there is a legal claim to practically every drop. The early trailblazers of the West understood the need to establish water rights and staked claims for uses such as irrigation, stockwater, and mining. But times are changing out West—from an era emphasizing water diversion to an era focusing on water conservation. Lotic LLC, a water rights marketing and management company, is positioning itself on the break of this wave of change.

In the last two years, Lotic has completed 30 water rights consulting projects across 18 states. These projects involve market and water rights analyses, asset management plans, brokerage, and valuations for a variety of industry sectors. But in every project, our work focuses on the confluence of economic prosperity and resource conservation, or as we put it, where *blue turns into green*.

Blue represents the historic, one-dimensional view of water. For example, the early settlers who claimed water for irrigation hardly imagined another use for their water. Yet new uses have arrived and they are green. *Green* can mean many things—wealth, efficiency, or sustainability. To Lotic, green can mean profitably leasing water instream to protect trout habitat, reallocating water rights to maximize resource values through wetland and riparian mitigation banks, or increasing operational efficiency by selling conserved water to growing municipalities.

Currently, Lotic is working on three projects that further illustrate our vision of *turning blue into green*.

Water rights are no longer one-dimensional pieces of paper—they are complex assets that should be maximized through the emerging markets of the West.



The Grass Valley French Ditch Company in Missoula, Montana, is challenged with maintaining its agricultural livelihood in the face of rapid urban growth. In response, Grass Valley is in the process of changing its water rights from their traditional irrigation and stockwater uses to a “marketing” use—a process that will offer more flexibility in water use and facilitate market exchanges. If granted, Grass Valley could lease or sell water to multiple buyers. The change would allow the ditch company to protect the remaining agricultural shareholders within the company, help finance maintenance and operations, and offer a source of contract water to mitigate future growth in municipal water use.

Lotic is also leading a new charge in the emerging wetland and riparian mitigation banking market. Mitigation banks help restore wetland and riparian habitat and receive “habitat credits” in return. When new development destroys wetland habitats, federal law requires that developers offset their impact. In many cases, the offset occurs through the purchase of credits from a mitigation bank. In the East, where water is abundant, finding mitigation credits is relatively easy. In contrast, western water is scarce and rights are defined and enforced based on more than a century of prior usage. To aid in the development of these mitigation banks, Lotic provides water rights inventory services and asset management plans, securing valid water rights for a mitigation bank. This increases the water bank’s return on investment and decreases its legal risk within the state’s existing water law. Lotic is also pursuing the

first-ever transformation of a water right from an irrigation to a riparian use for a proposed riparian mitigation bank. If successful, this will modify how we view and administer instream flows across the West.

Finally, Lotic helps individuals and companies reduce their water footprint—a measurement of water consumed during production. In 2010, Lotic brokered some of the first water restoration certificates for Big Sky Brewing Company, the largest brewery in Montana. This project allows the brewery to leverage water markets to restore more than 4 million gallons of water over three years to a dewatered Montana stream where it provides the greatest social and ecological gain. The emergence of water footprinting—and the secondary water rights market it creates—illustrates just how *green* water has become.

Water rights are no longer one-dimensional pieces of paper—they are complex assets that should be maximized through the emerging markets of the West. This recognition is what Lotic calls *turning blue into green*. It is the work we enjoy and the passion we will continue to pursue.



Visit percreports.org to watch a video



CHRIS CORBIN is the founder of Lotic LLC. He attended the PERC Enviropreneur™ Institute in 2008 as a Big Sky Brewing Company marketing man with an idea for Lotic. He can be reached at chris@loticwater.com.

Sourcing for style: an eco-model changes *the fashion landscape*

BY SUMMER RAYNE OAKES



Photo © Shawn Brackbill

My love for the environment drives my passion for fashion. When it comes to what we wear, we seldom consider how it affects the natural, cultural, and economic world around us. But both designers and consumers are becoming increasingly aware of the socio-environmental footprint caused by the clothing we produce and wear. More than ever, people want to style themselves naturally, but they're finding it difficult to do so.

Ask any fashion designer to identify the most challenging part of their job, and the answer will undoubtedly be "sourcing." Sourcing, or the pursuit and purchase of the materials and services needed to complete a design, is time-consuming and in need of systems and technology to streamline the process.

According to research undertaken by Source4Style over the past few years, designers source up to five times a year and can spend more than 75 percent of their total time sourcing for their collections. Because search costs are high compared to other necessary tasks like design and sales, this erodes valuable time needed to market the products to their intended customers, which compromises the success of the entire brand.

The challenge of sourcing becomes much greater when designers seek to source from environmentally friendly materials. Small-scale suppliers around the globe who produce green materials lack the channels necessary to reach

Source4Style is designed to be the business-to-business (B2B) online marketplace that allows designers and brands to search and source more eco-friendly materials and services from a network of global suppliers.



Photo © Shawn Brackbill

international buyers. This lack of market access becomes more apparent at a time when an increasing number of designers are looking to use such materials.

The idea for Source4Style emerged in the fall of 2009 based on initial research indicating that the barriers to sourcing, particularly eco-friendly sourcing, are extremely challenging for designers. On the other end of the supply chain, suppliers lack the potential benefit from having a user-friendly marketplace that showcases and sells their offerings more effectively.

Source4Style is designed to be the business-to-business (B2B) online marketplace that allows designers and brands to search and source more eco-friendly materials and services from a network of global suppliers. The marketplace opens up the inventory of materials—and eventually services—resulting in a 365-day-a-year online trade-show, whereby a designer can review materials, compare prices of similar product offerings, order a swatch, book an order, or connect with a supplier through insite messaging.

Source4Style collects up to 245 data points of technical, social, cultural, and environmental information for each specific material in order to capture a more robust snapshot of the fabric. Many of the environmental-related criteria are based on the Eco Index—the widely accepted environmental assessment tool for the apparel industry. This collection of baseline data creates a more transparent supply chain at the material level so designers can source based on the criteria that meets their design principles and

the principles of their consumers.

Sourcing in this way requires a subtle shift in mindset. Designers are not used to sourcing materials directly online. In some cases, independent designers—who generally spend anywhere from \$5,000–\$100,000 on materials every year—are unaccustomed to buying directly from the supplier (versus buying from a wholesaler). Source4Style gives the buyer the critical information needed to make the best purchase. The ability to purchase sampling yardage prior to purchasing the material for production allows for greater confidence in the product, without having to ever leave one's office. Source4Style is both a supplement and an alternative to traditional sourcing via long trips, trade-shows, showrooms, or online directories.

This change in buying patterns, along with new technology to help streamline the sourcing supply chain, creates a marketplace for eco-friendly materials. This will likely lead to crowd-sourcing around green design—the first step in making environmentally conscious design possible on a large scale.

On the horizon for Source4Style include increasingly sophisticated supply chain management tools; calculators to measure not just a sample garment's carbon footprint but also the footprint of one designer's specific supply chain; and mapping technology to promote vertical integration in a sector in which a single garment can travel the world before it finds a permanent home in someone's closet.

Acting as a curator for eco-friendly designs, Source4Style seeks to unveil globally what is produced locally and, in the process, use technology to bridge the divides that exist in the vast world of materials—changing the sourcing landscape and the designs it yields.



Visit percreports.org to watch a video



SUMMER RAYNE OAKES, a 2010 PERC enviropreneur alum, is co-founder and CEO of Source4Style. Oakes graduated from Cornell University with degrees in Environmental Science and Entomology. She can be seen modeling for many recognizable eco-brands. For more information on Source4Style, please email info@source4style.com or visit www.summerrayne.net.



ECONOMIST, n. a scoundrel whose faulty vision sees things as they really are, not as they ought to be. —after Ambrose Bierce

BARBED WIRE

ENTREPRENEURSHIP

Joseph Glidden transformed the American Plains. In 1874, Glidden patented the first practical design for barbed wire. The invention dramatically reduced the costs of separating cattle from crops and thus the costs of enforcing property rights to land. Farmers and historians have long been aware of the qualitative importance of barbed wire, but recent research by Richard Hornbeck (2010) makes clear the pivotal role of the invention in the late 19th century settlement of the American Plains.

Cattle wander, and without effective fencing they are so destructive to neighboring crops that cattle and crops cannot coexist. The early colonies adopted legal codes that required farmers to fence out others' livestock. Without a "lawful fence" a farmer could expect no compensation for damages done by wandering livestock. New states entering the Union continued this legal tradition.

As a practical matter, if farmers wished to protect their crops, fencing was a necessary—and substantial—investment. In 1872, the value of the fencing capital stock in the United States was roughly equal to the value of all livestock. Equivalently, the value of the fencing stock was as great as the national debt or the value of all railroads in the United States. In fact, annual fencing repair costs exceeded the combined tax receipts of all levels of government.

Wood had long been the fencing material of choice in America. But as settlers began moving into western Minnesota, west Texas, Kansas, Nebraska, and farther west, they found that a lack of woodlands, plus high transport costs, made fencing prohibitively expensive across wide areas. As a practical matter, it was not economically viable to settle in an area unless it happened to have a local timber plot. In effect, although Plains farmers had secure property rights to the *physical* land, because they could not protect their crops from cattle and other livestock,

property rights in the *economic value* of their lands were sharply attenuated. As early as the 1840s, the lack of timber throughout the Plains was recognized as the single most important barrier to settlement.

Glidden's invention eliminated that barrier and quickly changed the settlement calculus. The barbs prevented cattle from breaking the fence, and the steel wire was relatively weather-resistant. Moreover, Glidden's design was cheap to manufacture and, compared to wood, it had lower labor requirements for installation and repair. Within short order, barbed wire came to dominate fencing and to transform the economic decisions of settlers.

In 1874, five tons of barbed wire were produced; in 1880, 40,000 tons were manufactured; and by the turn of the century, annual production had reached 200,000 tons. This rapid rise in sales was stimulated in part by the practical superiority of wire. But it was accelerated by manufacturing improvements and falling steel prices, which together drove the price of barbed wire from \$20 per hundred pounds in 1874, to \$10 in 1880, and under \$2 by 1897. By 1910, not only had fencing stocks in the prairie states increased more than tenfold, wooden fences had essentially disappeared.

Barbed wire changed settlers' decision-making in a variety of ways. First, it made it economically feasible to



Photo courtesy of Devil's Rope Museum

settle lands without regard to proximity to timber stands. Thus, the total amount of land settled rose. Second, the lower-cost fencing increased the incentives of farmers to invest in quality-enhancing improvements to their lands. And third, the invention changed the choice of crops. Low-value hay, for example, is relatively resistant to livestock damage before being harvested, and hay fields can even be intentionally used for grazing at certain times of the year. In contrast, high-value crops such as corn, wheat, oats, barley, and rye are much more vulnerable to livestock damage. The spread of barbed wire enabled farmers to shift more of their lands to these higher value crops and raised productivity on land by roughly 30 percent.

It will come as little surprise, then, that barbed wire also caused a rapid and substantial rise in the value of land across the Plains. Hornbeck estimates that between 1880 and 1890, barbed wire caused the value of farmlands in the Plains to increase by 50 percent. His findings imply that the rise in farmland values over this period may have amounted to as much as 3 percent of total U.S. gross domestic product.

There is growing evidence from developing countries around the world, and even from Indian reservations in the United States, that insecure property rights limit economic development. In the middle of the nineteenth century, the development of American agriculture was similarly limited when Plains farmers were unable to protect frontier lands from encroachment by livestock, especially cattle. What makes the barbed wire episode so intriguing is that this conflict over resource use—between crops and livestock—was resolved not by lawsuit or even by legal reform. It was instead resolved by an entrepreneur who sought to solve a specific problem of enforcing property rights—and succeeded spectacularly. It is a lesson worth remembering as we seek solutions to today's conflicts over the use of environmental resources.

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Mud People & Super Farmers



*CREATIVELY ADAPTING TO THE LACK
OF LAND RIGHTS IN AFRICA*

BY G. PASCAL ZACHARY

In the lush highlands of eastern Uganda, mud is a valuable commodity—so long as it is “quality” mud, with certain characteristics coveted by residents who construct their homes out of the stuff.

The search for mud is simple. Go north toward the town of Sironko about ten miles from the provincial capital of Mbale, and then, a few hundred feet past a cellular phone tower, you turn off the paved road and wind down a potholed lane. There you join a procession of mud customers. They come in trucks, cars, and even on bicycles. Upon reaching the village, Bukhalo, driv-

ers turn left onto a narrower path that takes them into the finest mud quarry for many miles.

About two dozen families control specific pieces of the quarry. Each hires its own diggers, sells its own mud, and sets prices independent of each other. No individuals possess formal, legal title to their portion of the mud quarry, but no one considers this strange. Claims on the mud lands stretch back to the years before Uganda’s independence in 1962, when the British managed these parts. Everyone knows that their ancestors bequeathed them the use of a particular patch of the mud quarry.

No one has ever asked for proof of their ownership or even tallied the costs of forgoing title in favor of “customary law.”

MUDSLINGING IN BUKHALO

Yet costs are clear. The families are mired in mistrust. Interfamily squabbles dominate conflicts and theft of mud is common. Without clear boundaries between mud plots, no one seems responsible for insuring the quarry is flushed with adequate levels of water. No improvements to the quarry have been made. There’s no marketing of the mud. The quarry even lacks a sign.





The trials of Bukhalo’s mud people suggest an urgent need for new legal and political arrangements. In eastern Uganda, as in much of rural sub-Saharan African, land titles don’t exist.

Disputes between conflicting mud entrepreneurs do get settled—often by visits from the police or trips to the local judge. Settlements are idiosyncratic, and no one keeps records of anything, so when the same type of dispute surfaces, the whole issue must be handled anew. Worse, the lack of cooperation, borne of mistrust and unspecified property rights, produces a “beggar thy neighbor” approach to the pricing of mud. A truck load of mud can fetch \$50 on a good day. Yet on any given day, buyers of mud flock to the person selling for the lowest price; and that’s usually the seller with the most

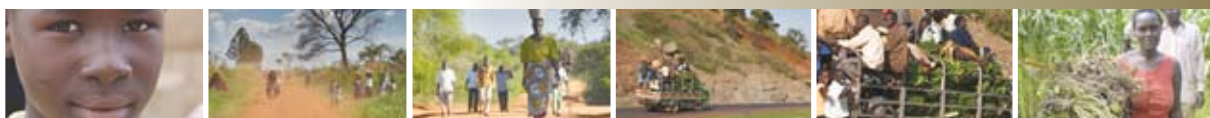
urgent need for cash. Rather than create a mud cartel—setting a common price and literally “carving up” the market in an orderly manner—owners undercut each other in a race that some days leads to the bottom. The process hurts everyone in the village by reducing its prized asset.

The trials of Bukhalo’s mud people suggest an urgent need for new legal and political arrangements. In eastern Uganda, as in much of rural sub-Saharan African, land titles don’t exist. There is no national movement in Uganda to get land titling either. Not even experimental titling projects exist. And customary owner-

ship arrangements, stretching back hundreds of years, seem destined to exist for an eternity, despite their painful costs.

On the bright side, I’ve made seven visits to Bukhalo since 2005, and I’ve learned that the missed opportunities for the mud quarry, however perplexing, coexist alongside a growing appreciation among Bukhalo’s farmers for the benefits of property rights.

Farmers in these parts grow food for themselves, but they also grow a variety of cash crops: corn, cotton, beans, peanuts, and sunflower seeds. Corn is especially profitable because





Working as a team, Ken and Jessica Sakwa (above) began an upward ascent as corn farmers in Bukhalo.

it stores well and can be sold across borders. Buyers in Kenya and south Sudan pay more—sometimes double—the local market.

The appetite for corn has ignited a frenzy among the enterprising farmers for more land. The more land they can farm, the more corn they can grow (and cash they can collect). The obstacle to greater wealth, however, is the same as that faced by the mud harvesters: no property rights, no titles, no open market for the buying and selling of land, and no use of land as collateral against loans.

For decades farmers accepted the situation. Much land, as a consequence, sat idle. When families left for

the big city—as many have done—their land lay fallow. Families often refused to allow others to farm it, fearing that by doing so, even in return for rent, they might lose their customary ownership of the land. Barter presented a solution, but often crops could not easily be turned into cash, rendering them essentially valueless to an absentee farmer. So the safest path was to idle the land until a family member returned to work it himself.

CONTRACTS WITHOUT TITLES

When Ken Sakwa returned to his family land in Bukhalo from Kampala, the capital of Uganda, he faced this very situation. Having failed to

earn a decent living in the big city, he took up farming on his late father's land about ten years ago. After six frustrating months in which he succeeded only in reminding himself how little he remembered about the intricacies of farming, Mr. Sakwa married a talented female farmer from a neighboring village.

Working as a team, Ken and Jessica Sakwa began an upward ascent. Within a few years, they were farming the three acres that Ken inherited. They started to save money. There is little to buy in Bukhalo and the Sakwas are thrifty. They kept their money hidden in their mud house until one day Mr. Sakwa had an idea: he knew





The contract, two pages long, boiled down to a single sentence:
“I Madam Kawna have sold my swampy land of 61 strides in length
and 32 strides in width for 330,000 shillings,” or about US\$185.

the price of corn and he knew that many neighbors lacked the labor or enterprise to farm all of their land. Why not rent or buy the idle land from neighbors?

Mr. Sakwa found a neighbor willing to sell him a suitable piece of land. To secure the deal, he wrote up a simple contract and the seller signed. The contract, two pages long, boiled down to a single sentence: “I Madam Kawna have sold my swampy land of 61 strides in length and 32 strides in width for 330,000 shillings,” or about US\$185.

Mr. Sakwa obtained a half-dozen plots of land in this same way over the course of a few years. He estab-

lished a fair price by calculating how much corn the land can produce in a normal year. Then he subtracted his expected expenses and gave the seller a portion of the annual anticipated profits from farming the land.

The agreements have helped the Sakwa family prosper. But because there are no formal land titles, but only idiosyncratic contracts filed with a local magistrate, disputes are common. Having paid in advance for the use of a neighbor’s land, Mr. Sakwa sometimes faces “submarine” claims by people who say they are relatives of the seller and insist they too should receive money for his use of “their” land.

Mr. Sakwa has successfully fended off these claims with the help of a local judge who understands that, even in the absence of a land titling system, exchanges of land for money are occurring and will continue to occur, in part because of the market incentives to farm idle land. This judge has helped Mr. Sakwa settle disputes, though in two cases he has been forced to make additional payments to the original owners.

Fear of legal wrangles discourages Mr. Sakwa from making more land deals. Rather than expanding his holdings in an insecure fashion, he is shifting away from farming and moving into the buying and selling





of crops. He's bought a truck with money that might have gone into more land acquisitions. With his truck, he's begun a thriving business buying crops from growers and then ferrying the crops to buyers in cities. While margins are small, and Mr. Sakwa must sometimes front money to farmers for seeds or to help them in emergencies, he prefers his emergent role in agribusiness to the tricky task of assembling more farm land.

MOUNTING A CAMPAIGN

These very different tales in one African village present a common lesson for property-rights advocates. The attachment to customary land

arrangements, coupled with the absence of a political movement to bring explicit property rights to rural Africans, means that the full benefits of legal land ownership will escape ordinary Africans for some time, perhaps many years. The ultimate answer is for government and civil society to mount a comprehensive campaign to title rural land in much the same way as they have done in most African cities, where urban land—and notably private residences—is backed by legal titles that are registered with courts and government agencies.

The major obstacle to a broad-based campaign for expanded land rights is the relatively weak posi-

tion of rural people throughout the sub-Saharan area. There are flickering signs of change. The African Union, the region's leading political association, raised the profile of land issues in 2009 with a declaration on "the need for strong systems of land governance." But there has been no agreement on what those systems should look like. In some highly centralized countries, such as Ethiopia, the government appears to want weak land rights in order to facilitate land sales to foreign agribusiness companies. In countries with strong democratic traditions, such as Ghana, the power of land is so distributed and shared that making refinements





The choices of both the mud quarry owners and the Sakwa family are not without shortcomings, yet they deserve to be viewed as part of a journey toward true property rights.

to customary principles in rural areas is difficult. And then there are countries such as Kenya, South Africa, and Zimbabwe, where white settlers appropriated land during colonial periods and where efforts at redress have often been stalled, abandoned, or mishandled. In these countries, legacy land issues overshadow the everyday practical reforms that are still needed. In short, despite a growing awareness of the importance of improving “systems of land governance,” land reform remains a low priority in Africa.

Yet experiences in Bukhalo offer reasons for optimism. While the need for titling and clearer property

rights is apparent, the lack of them is not paralyzing this village. The people of Bukhalo are not passively accepting their situation. Rather they are fitfully improvising, crafting creative adaptations to difficult situations. These adaptations, as the choices of both the mud quarry owners and the Sakwa family suggest, are not without shortcomings, yet they deserve to be viewed as part of a journey toward true property rights—a bumpy, but genuine one.



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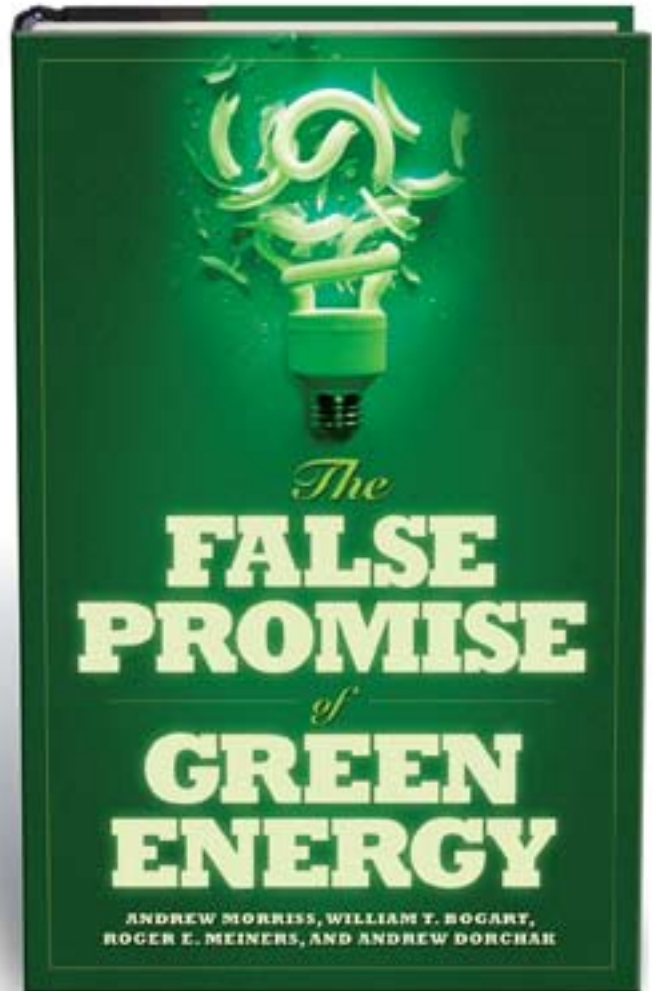
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THINKING BEYOND

Open Spaces

Let's say you're an environmental do-gooder, trying to keep suburban development from engulfing the bucolic landscape where you live. You're motivated by several desires: an aesthetic love of open space, a sentimental attachment to your region's agricultural heritage, and a preference for local food. But instead of pursuing your goal through regulation—by zoning changes that increase the minimum parcel size—you decide to accomplish it through market transactions. Your nonprofit acquires conservation easements from willing sellers that prevent them from subdividing their dairy or cattle ranches. Case closed, farms saved, mission accomplished, right?

Not so fast. Beginning in 1980, the Marin Agricultural Land Trust (MALT) tried that strategy for a few decades amid coastal pastures just north of San Francisco, and it worked for a while. But then a new predicament popped up. City dwellers were cashing out of the urban real estate market in exchange for rural estates. Instead of the specter of suburban sprawl, trophy homes with hundred-acre backyards were threatening to supplant the area's historic ranches. Although the new owners might leave the open space untouched, they might also withdraw the parcel from the local farm base.

Students of economics might wonder why productive land would fall out of cultivation. If the farm was economically viable, wouldn't the owner either cultivate it or lease it to someone else who would? The answer lies in consumer preferences: affluent owners, for example, might value their privacy more than the extra revenue they could expect from a lease for someone to farm on their land.

"You have this situation on both coasts," says Jim Oldham, executive director of Equity Trust, a Massachusetts-based land trust that operates nationwide. "You have it wherever you're close enough to a city that money can get to the countryside easily."

To keep land in farming, not merely in open space, Oldham's group has made use of several methods. It may acquire an option to purchase the property at its agricultural value. Then, if the land is about to be sold for a non-farm use, the trust can buy it and turn it over to a farmer at an affordable price, subject to a similar restriction. Another method is to include an "affirmative" farming clause in the easement, which requires the land to stay in production. Finally, the land trust can hold title to the property and lease the ground to a farmer, who would own the improvements but not the underlying land.

On Live Power Farm in northern California, the Decater family was farming organically on ground they had leased from a private party. When the land went up for sale, they couldn't afford to buy it at full market value on the strength of their farm income alone. But after Equity Trust bought a conservation easement that guarantees the farm will be cultivated and allows the trust to buy it at its farm value if it were ever to fall out of production, the Decaters were able to afford the remainder of the purchase price. Many of the subscribers to the Decaters' Community-Supported Agriculture arrangement, who receive a weekly share of the produce grown on the farm, made donations to Equity Trust to help fund the easement's purchase—providing secure land tenure to the farmers who raise their food.

In New York's Hudson Valley, Equity Trust helped a pair of established farmers find a permanent site for their operation. With donations, the trust bought the 150-acre site and committed the land to the farmers in a 99-year lease that requires the land to remain in cultivation. The farmers bought the house and other improvements but were buffered from the escalating price of land. Equity Trust has carried out similar projects in Massachusetts and New Hampshire, and recently several other land trusts have adopted analogous strategies.

Back on the West Coast, MALT now negotiates for easements that require the property to stay in agricultural production. If the owner doesn't ranch it or lease it for grazing, the land trust can step in and broker a lease itself.

As MALT executive director Bob Berner points out, farmland preservation is different from other kinds of conservation. "Most other easements are preserving a natural feature of the property," he says. "These are protecting a particular human use."

Look a little deeper, though, and a similarity emerges. The underlying purpose of many easements is to protect habitat for a threatened species, such as an eagle. These agricultural easements aim to protect habitat for farmers—if the land is whole but unfarmed, the soil may be intact, but the creatures whose habitat was to be protected (the farmers) will be as bereft as if it were covered in asphalt.

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PARKING MADE SIMPLE

Learning how to park takes a few weeks, but finding a place to park takes a lifetime. Streetline, a San Francisco-based start up, has help on the way. Its new technology beams the location of the closest open parking spaces to anyone with an iPhone and the new app—Parker. Streetline promises to reduce driver frustration, gas consumption, air pollution, and traffic congestion, while bringing joy to meter maids everywhere.

If this sounds amazing, it is, but so is the problem—and it is getting worse. A few years ago, UCLA students documented parking problems near their Westwood campus. The group reported that motorists traveled an extra 950,000 miles per year in search of parking spots and that the average search time in late afternoon was 12 minutes. Parking policy experts see Streetline as an important step toward solving parking problems in densely populated urban areas. IBM also bestowed its blessing on Streetline by naming its CEO, Zia Yusef, the IBM Global Entrepreneur of 2010.

So how does it work? Let's begin at the pavement. It takes only minutes to embed a durable, energy-efficient, wireless sensor in the street where it collects information on a single parking space and feeds it to a server. From there it is available to motorists circling the block, traffic engineers, transportation managers, meter maintenance workers, and parking police. If you are behind the wheel,

the Parker app is a motorist's best friend. It not only finds the closest open spaces, but then notifies the driver when the meter is about to expire. For those who want to linger over dessert, the iPhone app can help by adding time to the meter. It should be noted, however, that new high-tech meters are needed to enjoy all of Streetline's features.

More money in city coffers is also a Streetline benefit. Broken meters can be quickly identified and repaired, and parking prices can be adjusted to parking demand. At midday on a busy downtown street, a parking space could be a chunk of change, but at 9 p.m. the same space might be on sale for a quarter.

As luck would have it, Hollywood is one of the first areas selected by Streetline for a trial run. So far, so good. Tourists are seeing the sights with fewer hassles, and the stars are able to get their nails done and pick up a new Prada bag with no fear of a parking ticket.

The Parker app is currently available for the iPhone but an Android version is in the works.

www.streetlinenetworks.com/parker





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FLIP-FLOPS ARE FOREVER

Flip-flops are some of the most basic footwear in the world, a fact that is easily documented by the tons of discarded sandals washed up onto the east coast of Africa from as far away as Japan, China, Indonesia, Malaysia, and elsewhere. Virtually indestructible, they float through the ocean posing a threat to marine animals and end up as a blight on beautiful beaches. Tangled with driftwood and other debris, they can prevent female turtles from coming ashore to nest and block hatchlings from safely reaching the sea.

Julie Church, a native of Nairobi, one of the world's experts on coral fish and a passionate marine conservationist, became concerned about the unsightly flip-flops strewn across Kenya's beaches while working for the World Wildlife Fund. She knew that the debris was not only a threat to the marine ecosystem, but could also drive away tourists who were vital to the economy. Local people were making buoys and stuffing cushions with the discarded sandals, while children picked up the brightly colored pieces to build toys. Thinking on a larger scale, Church could see other possibilities. UniquEco was born.

Today, UniquEco is a growing business, employing people from disadvantaged areas to make jewelry, toys, and artwork from old flip-flops. Church wanted to create a commercial enterprise rather than a nonprofit. From past experience, she knew that while flip-flops are forever,

donors are not. A small army of people are working for UniquEco in a variety of roles, including collecting the flip-flops, washing them, cutting them into pieces, and gluing them together into solid blocks that are sanded to a smooth surface. Each block is a brilliant array of colors. Finally, artisans cut, carve, and shape the blocks into tropical fish, water buffalo, toys, bracelets, necklaces, placemats, beaded curtains—most anything one can imagine can be created from this lightweight rubber.

UniquEco's work has attracted international attention, and several pieces of art have been commissioned. A 15-foot-tall giraffe named Twiga was a main attraction at the Rome Fashion Week, and a life-sized minke whale named Mfalme is on display in Mombasa. Church and her partner Tahreni Bwanaali continue to grow their business by adding value to the unlimited supply of washed-up flip-flops. Many local people in remote areas have steady incomes, the beaches are cleaner, and the marine habitat is being protected.

For more information about UniquEco:
www.uniqueco-designs.com





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RESTORE A PARK, SAVE A NATION

Gregg Carr made a fortune with voicemail and the Internet before resigning from every one of his for-profit positions to become a philanthropist. He believes that giving is a form of entrepreneurship and that private enterprise is the best way to bring about change in the world.

For several years, he tried theater, museums, and even created the Center for Human Rights at Harvard with a gift of \$18 million before stumbling across the country of Mozambique. Twice the size of California, Mozambique is one of the poorest nations on earth, with rampant HIV/AIDS and a life expectancy of 40. It also has 1,500 miles of stunning white-sand beaches, rain forests draped in flowering plants and, at one time, the extraordinary Gorongosa National Park overflowing with big game herds and wildlife of every description.

It was here that Carr found his next challenge. He wanted to boost the economy by creating a multi-billion dollar industry without destroying the environment. His answer was tourism. In 2005, he signed an agreement with Mozambique's Ministry of Tourism to donate \$40 million over 30 years for the ecological restoration and economic development of Gorongosa. The government recognized the dire need for conservation but could not afford to run a national park. As in many poor nations, food, housing, and medical care are the priorities, not investment in the environment.

The task ahead was enormous. The park, which had once teemed with wildlife and drew more visitors than

the Serengeti, was silent when Carr first visited. He could walk or drive all day without seeing one living creature except a few birds. A 16-year-long civil war had ravaged the park. Battles raged within its borders, game was slaughtered for food, trails and roads were mined, and starving villagers cleared land for crops. Carr began his restoration efforts with rural people. They needed jobs, clinics, schools, clean water, and food grown with conservation-friendly agricultural practices.

His grand plan called for restoring the wildlife, which would attract tourists, then building environmentally friendly lodges throughout the park and recruiting experienced managers to run them and share in the profits. A lot has been accomplished in a short time. Hippos wallow in the rivers, elephants come to drink at the lakes, and the forest once again rustles with the sound of wild animals.

Yet there is far more to do, and Carr expects to spend the rest of his working life in Gorongosa. Although there have been disappointments and setbacks, he remains convinced that the fastest way to solve a problem is with "economics," not "public policy." He was quoted in the *New Yorker* saying, "Every private sector entrepreneur has this incredible bias toward letting enlightened self-interest pull things along, and I fully believe this will happen."

For more information about Gorongosa:

www.gorongosa.net

Climate GOES BACK TO COURT

In 2007, the U.S. Supreme Court declared greenhouse gases to be pollutants subject to regulation under the Clean Air Act. The Court's decision in *Massachusetts v. EPA* triggered a series of far-reaching regulatory proposals from the Environmental Protection Agency designed to control greenhouse gas emissions from motor vehicles, utilities, and other sources. But this was not the end of climate litigation.

A series of lawsuits filed by state attorneys general, environmentalist groups, and plaintiffs' lawyers have called upon federal courts to declare global warming a "public nuisance" and impose judicially devised emission controls. In these cases, federal judges have struggled with jurisdictional and procedural questions as they have considered how to apply the common law of nuisance to global climate change. One of these cases, *American Electric Power v. Connecticut*, has made its way up to the Supreme Court and will be argued this spring. This case has potentially broad implications for climate change litigation and policy.

The *American Electric Power* case began when several northeastern states and a handful of environmentalist groups sued several of the nation's largest utilities, alleging their emissions of greenhouse gases, largely from coal-fired power plants, constituted actionable contributions to the "public nuisance" of global warming. Instead of monetary damages, the enterprising attorneys general, who spearheaded this litigation, sought court-ordered emission controls. The utilities responded with the argument that federal courts lack jurisdiction to consider questions related to global climate change. As a global problem, climate change is a "generalized grievance" that affects everyone, the defendants argued, and should therefore be left to the political process. The district court agreed. The U.S. Court of Appeals for the Second Circuit did not. Now it is the Supreme Court's turn.

This case raises several questions which could determine whether federal courts will continue to hear cases raising nuisance claims against emitters of greenhouse gases. Among other things, the Court will consider whether states and environmentalist groups have standing to bring such claims. The Court narrowly concluded that states had standing to sue the EPA over its failure to regulate greenhouse gases in *Massachusetts v. EPA*, but that does not mean Connecticut and other states have standing. In *Massachusetts*, the Court found reasons to grant states "special solicitude" under the Clean Air Act, but these reasons are not applicable here. Specifically, the Court stressed that Massachusetts

was seeking to protect a procedural right to challenge EPA action as guaranteed by the Clean Air Act. Connecticut, on the other hand, is simply filing a common law claim.

Although the Obama Administration has moved to impose regulations on greenhouse gas emissions, it has also encouraged the Court to accept this case and curtail climate change nuisance litigation. The Solicitor General's office filed a brief with the Court suggesting both that the plaintiffs lack standing and that the promulgation of greenhouse gas regulations by EPA should preclude this suit.

Whether or not the predicted effects of global warming could constitute a public nuisance under common law, the claim is that federal regulation is sufficiently pervasive to displace traditional common law remedies in federal court. This is not a new argument. Federal regulation of water pollution precluded downstream states from pursuing nuisance claims against upstream states—often with significant environmental consequences. By the same token, the Justice Department suggested, if regulators are addressing climate change concerns with new regulatory measures, there is no room for nuisance-based claims in federal court. Given the Court's *Massachusetts* holding that the Clean Air Act covers greenhouse gases, it is indisputable that Congress has occupied the field with a comprehensive regulatory scheme, so the same logic that controlled the water pollution cases would seem to apply here.

The Court is unlikely to reconsider any of its *Massachusetts v. EPA* findings, but the decision in *American Electric Power* could have far-reaching implications nonetheless. A narrow decision could bring much climate-based litigation to a halt, while a broad affirmance of the Second Circuit's reasoning could unleash a torrent of new legal claims. A split decision—a real possibility because Justice Sonia Sotomayor is recused—would foster continued uncertainty on whether courts are the proper place to answer questions of climate change policy. We should have an answer later this spring.



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