


RESOURCES

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INVASIVE SPECIES



LAND TRUSTS

BROWNFIELDS
REFORM



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PAUL R. PORTNEY

A Thousand Flowers Blooming

Each issue of *Resources* contains a rich sampling of the research that is ongoing at RFF, distilled and edited for a general but discerning audience.

While our magazine spotlights much of the policy-oriented work that we believe affects the dynamics of decisionmaking in Washington and around the nation, it cannot capture in any detail the myriad activities and events that take place here every week.

Behind the scenes, researchers regularly convene technical workshops to consult with their counterparts in academia, government, and the business and NGO communities about research findings and policy developments. The exchanges that occur in these gatherings play an important part in maintaining RFF's reputation as a neutral broker of sound information.

Throughout our history, RFF has opened its doors to the general public through regular seminars on a huge range of issues, presented both by our own researchers and by invited outside speakers and often held in collaboration with other institutions.

Here are but a few examples of recent events:

A seminar on shade-grown coffee was the culmination of a project carried out over several years by RFF researchers in Mexico. The session brought together foreign aid workers, diplomats, World Bank officials, corporate executives, and congressional staff to learn about the environmental and economic benefits of coffee grown in shaded forest areas. Fortunately, this event and others are available online in full video and audio on the RFF website, and I invite you to log on and give a listen to a stimulating and topical discussion.

Another seminar was on "split estates," a source of conflict in the American West, pitting farmers and ranchers, who own the surface rights to their properties, against energy and mining companies eager to tap underground oil, gas, and minerals owned by them or the federal government. You can read a summary of the session on page 7, and you can also watch the proceedings via online video at our website.

In a special seminar held last fall in conjunction with New York University's Stern School of Business, I was privileged to share with a diverse group of academics, businesspeople, journalists, and students my ideas about corporate social responsibility and how private business can contribute expertise and manpower to improve the lives of those in their communities. Once again, the entire proceeding is available online at www.rff.org.

These sessions, plus hundreds of brown-bag and informal meetings throughout the year, provide the sharing of knowledge and exchange of views that are essential to making RFF a robust and productive policy shop. While all that goes on can't be conveyed in these pages, we invite you to attend any of our public meetings when you are in the Washington area, and to follow our conversations online. ■

Paul R. Portney

Electric Power Industry Leader Endows Chair in Risk Analysis



CHAUNCEY STARR

Chauncey Starr, founder of the Electric Power Research Institute (EPRI) and a pioneer in the field of risk analysis, has donated \$2 million to RFF to fund a chair in risk analysis that will bear his name.

RFF President Paul Portney said, "Chauncey's generosity will make it possible for researchers at RFF to explore a field that is becoming increasingly vital in setting policy in such areas as environmental health risk assessment, climate change, food safety, and energy systems. Equally pleasing to me is that the chair will bear the name of a man whose research led to the creation of a field in which I and several of my RFF colleagues have labored."

"The establishment of a chair in risk analysis at RFF represents a significant milestone for me," Starr said, in an interview with *Resources*. "In the broadest sense, my personal goal meshes with RFF's mission. I have a strong interest in seeing the results of research make a difference in the public policy process through government service, participation on expert advisory panels, delivery of congressional testimony, and so on. RFF is one of the few institutions capable of having a lasting influence on government policymakers about the importance of risk analysis."

His gift will establish the third endowed senior fellow position at RFF.

The Starr chair will be used to recruit a senior scholar with a record of high-caliber research, whose work significantly advances the way society understands and manages a variety of risks to human health and the environment.

Risk analysis is broadly defined to include risk assessment, risk characterization, risk communication, and policy related to risk. It is conducted in a number of fields, including toxicology, epidemiology, engineering, economics, law, and psychology.

How Safe is Safe Enough?

An important figure in the electric power industry since World War II, Starr spent 20 years at Rockwell International, building the Atomics International division. Starr first came to know RFF around the time of its founding, through his relationships with its early leaders—Sam Schurr, Hans Landsberg, and Joel Darmstadter—where he found common ground around national energy issues.

The use of nuclear power for civilian energy purposes, and its competitive role in the national energy future, became a major focus for Starr. "As an engineer and physicist, I started out looking at this question from a technical perspective but I quickly realized that mineral resource and energy economics, RFF's early strength, were a critical part of the equation."

As his research progressed, Starr

broadened his inquiry to consider the environmental and safety aspects of nuclear power. In the late 1960s, when Starr was the dean of the School of Engineering at the University of California—Los Angeles, he explored the quantitative aspects of these issues with his graduate students. "The question we addressed was 'how safe was safe enough' when adding technical devices to achieve inherent systems safety," he said. "The application to nuclear power was obvious because there is no theoretical limit to adding containment to hold leaking radiation, but there are obvious practical and economic constraints." Together they carried out an analysis of what level of risk society has voluntarily accepted in existing systems, using the mountain of accident data collected by many entities.

Starr's ties to EPRI date back to the great blackout of 1965. The entire Northeast was left without power, prompting a congressional investigation into how the power industry could have prevented this. The Senate committee found that very little research had been done on advanced safety systems. The power industry responded to the committee's charge by establishing EPRI and asking Starr, then in his 60s, to serve as president.

Now, at 92, Starr serves as president emeritus and still comes into the office regularly, where he is working on a new book. ■

DOE Under Sec'y. Card on the Tension Between Cutting Greenhouse Gas Emissions and Relying on Natural Gas

Possible reduction of greenhouse gases now constitutes the greatest long-term uncertainty in energy markets, then-U.S. Under Secretary of Energy Robert G. Card said. He spoke at the inaugural Hans Landsberg Memorial Lecture, held at RFF in January.



Greenhouse gases, especially carbon dioxide generated by burning fossil fuels, contribute to global warming.

High demand for natural gas will keep prices up in the present range, Card predicted. That will result in a significant rise in imports of liquefied natural gas brought in by ship, some of it from the Middle East. Like transportation, the heating and electricity-generating sectors of the energy economy will be dependent on imports, he said.

Politically motivated embargoes on gas, like the Arab countries' embargo of oil to the United States in the early 1970s, seem unlikely, Card observed, because of the suppliers' need for revenue.

"But if you look at the reliability of the suppliers, it's not altogether comforting," he added. Some of the future imports will presumably come from the Persian Gulf region, especially Qatar, where the reserves are vast.

The Bush administration believes that the emphasis in the 1990s on using natural gas in all sectors of the economy as a cleaner-burning fuel was unhealthy, Card said, and encouraging a diversity of fuels is wiser policy. But that means greater reliance on coal and oil, fuels that produce more greenhouse gas per unit of heat than natural gas does.

In making policy to reduce greenhouse emissions, Card warned, it is essential to remember, "we have to bring the American public along."

The Clinton administration helped draft the 1997 Kyoto Protocol, a treaty that would require most of the developed countries to reduce their emissions by 2012. But President Clinton never sent it to the Senate for ratification, and, in 2001, President Bush withdrew administration support from it on grounds that it would damage the economy.

If the world decides to regulate emissions, Card asked, who decides on the reduction target, and by what process? There are "huge philosophical issues here," he said.

The Bush administration is relying chiefly on technological innovation to reduce emissions. However, those innovations have to be applicable worldwide, Card observed. "Our coal program is really focused on China and India," he said.

The Hans Landsberg Memorial Lecture is an annual event dedicated to the memory of Landsberg, a pioneer in energy and mineral economics who was a devoted member of the RFF staff for nearly 40 years. ■

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CEQ Chief Connaughton Addresses Role of Developing Countries in Setting World Climate Policy

Global policy to mitigate global warming will have to include the developing countries from the beginning, said James L. Connaughton, chairman of the White House Council on Environmental Quality. He spoke at an RFF Policy Leadership Forum, held in January.

If developing countries do not participate, he said, the climate regime will suffer “leakage”—the migration of industries to countries with no restrictions on emissions of the greenhouse gases that contribute to climate change.

The Kyoto Protocol, a treaty signed by most of the world’s governments but not yet in force, would put emissions limits only on developed countries. The Bush administration opposes the protocol.

Integrating the developing countries into an effective world climate policy is proving a major issue. Greenhouse gases are generated mainly by burning the fossil fuels on which modern industry runs, and many of the poor countries suspect that emissions limits are a ruse to hold back their rise to prosperity.

Connaughton suggested that the solution might be to address those countries’ immediate concerns by linking ways to reduce air pollution, which has become a major health threat in many of the rapidly industri-



If developing countries do not participate, the climate regime will suffer “leakage”—the migration of industries to countries with no restrictions on emissions of the greenhouse gases that contribute to climate change.

alizing economies, with the longer-term plans to control greenhouse emissions.

He vigorously defended President Bush’s proposal to use emissions intensity—the ratio of carbon dioxide emissions to Gross Domestic Product—as an appropriate measure of U.S. progress on carbon mitigation. The Kyoto Protocol uses a country’s total emissions as its basic measure. One of President Bush’s reasons for opposing Kyoto is the difficulty, at least in the short-to-medium term, of reducing emissions without shrinking the economy that produces them.

Connaughton’s comments on climate policy came in response to questions from the audience. His talk surveyed the environmental advances of the past 30 years. The administration believes, he said, that technical innovation promises more progress than litigation. ■

Placing a Value on Health: What's the Right Approach?

We make decisions every day trading off health risks for money or time.

How fast should we drive? What should we spend on that health club membership? How often should we go to the doctor? What type of job should we take? Should we cross the street against the red light to save time?

Similarly, policymakers weigh the costs and benefits of their decisions on what to spend on environmental protection, medical research, preventative measures, public outreach, and a host of other health-related activities. Economists quantify these decisions in many ways. Some use a dollars-and-cents framework. One approach is to calculate people's "willingness to pay," which evaluates the trade-offs they make (or think they would make) between health and wealth. Such trade-offs in daily life are easily recognized—we may take a riskier job if higher pay compensates us accordingly—but not so easily quantified. This approach is routinely used by many government agencies in evaluating regulations that affect health or mortality risks.

Another approach, called a quality-adjusted life year, or QALY, combines a person's expected length of life with the quality of that life. This approach can be used in a cost-effectiveness analysis of several competing treat-

ments. For instance, one treatment might entail significant risks of death, but significant promise of full recovery, while another might yield a lower chance of death but a higher chance of keeping the chronic illness. If the cost of each treatment is divided by the QALY measures representing these health outcomes, a cost per QALY improvement can be calculated to help distinguish between the desirability of the two interventions. This approach is often used in the setting described above, but is much less frequently used to address regulatory choices in a public policy setting.

Senior Fellow Alan Krupnick evaluates the willingness-to-pay and the QALY approaches—and others—as they apply to a public policy setting in his new RFF Report, *Valuing Health Outcomes: Policy Choices and Technical Issues*. Krupnick sorts out the assumptions underlying these tools so that policymakers can better understand the implications of their choices with regard to effectiveness, efficiency, and equity.

Some of the political controversies in the field are also addressed in the report. Willingness to pay and "value of a statistical life" (VSL) connote to some that policymakers put a value on human health and life. This reflects several misunderstandings. These values represent the strength of preferences of ordinary individuals for changes in their health states, not those of policymakers. With respect to the VSL, these values represent the average of many individuals' willingness to pay for a small reduction in their risk of death,

divided by that risk reduction. Human life is not being valued.

Krupnick also raises fundamental questions about whose preferences should be considered when formulating health policy—the individual affected, the family, medical professionals, or society? For example, on whose shoulders should rest decisions about how much society should spend to reduce childhood asthma or leukemia as opposed to breast and prostate cancers, which primarily affect older individuals?

Krupnick's report is in response to new guidance issued by the OMB that asks agencies to rely more on cost-effectiveness measures, including those with QALYs, and to seek greater standardization of their health valuation tools. His summation

of the issues will give decisionmakers throughout government, the health care professions, and academia much-needed information to help advance protocols for making better government decisions affecting health.

This report uses source material from a conference and workshop with valuation experts and practitioners held in 2003 at RFF and sponsored by many government agencies with interests in this topic. *Valuing Health Outcomes* reflects this collective input as well as RFF scholarship in this field. Presentations and participant bios are available at www.rff.org/ValuingHealthOutcomes, along with a video interview with the author explaining the basic concepts behind this thought-provoking topic. ■



Estimating the Economic Impacts from Reuse of Contaminated Sites

Katherine N. Probst and Kris Wernstedt

Federal, state, and local agencies are increasingly emphasizing the reuse of contaminated properties as part of their cleanup strategies. The advantages are obvious. Bringing new energy and focus to these sites can sometimes turn a problem property into a positive outcome for the community.

At the federal level, the U.S. Environmental Protection Agency's (EPA) "brownfields" program has embraced both cleanup and reuse as central to its mission since its inception. Under the current and prior administrations, EPA's Office of Solid Waste & Emergency Response has broadened its concern with stimulating reuse to include all four of its major cleanup programs. For example, the Superfund program now touts success stories of turning contaminated properties on the National Priorities List into sites hosting new retail busi-

nesses and golf courses. Many state regulatory agencies also have encouraged reuse at the contaminated properties that come under their jurisdiction, while local governments have promoted reuse as a way to strengthen their local economies and tax bases.

Proponents argue that reusing contaminated land has all sorts of positive impacts such as creating jobs, increasing tax revenues, and helping revitalize transitional neighborhoods. However, few studies have systematically and rigorously documented these kinds of positive economic effects. The fact that various EPA and state efforts to track the effects have used different measures of economic impacts further complicates the picture.

To discuss the challenges of measuring the economic impacts from reuse of contaminated sites, RFF re-

cently held a one-day workshop in conjunction with EPA's National Center for Environmental Economics (the sponsor) and Industrial Economics, Incorporated (IEc). The purpose was to bring together approximately 50 economists, other academics, practitioners in the public and private sectors, and senior EPA managers from all of the major cleanup programs to talk about the available methods for estimating the community impacts of reuse of contaminated properties and to discuss what these estimates mean and how they should be used.

The workshop highlighted that a wide range of perspectives exists on how to measure impacts. It is clear that government officials—at the federal, state, and local levels—face pressure to demonstrate positive results from their programs, with job creation being the most popular measure for doing so. And yet, many of the economists at the workshop cautioned that most of these new jobs likely represent a transfer of jobs from other local businesses or businesses from other areas. For an economist, these transfers do not represent an economic benefit from a national perspective. In other words, the reuse of contaminated properties may well achieve good outcomes, such as helping jump-start economic revitalization in transitional communities, but this does not necessarily mean that this represents the best use of resources for the nation as a whole. At the same time, it may well be that evaluating reuse efforts from an economist's perspective may *not* be the best approach for programs expressly focused on local outcomes.

RFF and IEc will be producing a summary of lessons learned from the workshop, as well as two background papers. For more information go to www.rff.org/sitereuse. ■



Splitting the Difference: Protecting Landowners and Energy Producers in the American West

In much of the western United States, private land is subject to legal arrangements known as “split estates,” in which landowners control what is on the surface, while others, such as energy and mining companies, own or lease the rights to underground oil, gas, and minerals.

Fairly balancing the rights of farmers and ranchers—and the industries hoping to extract buried fuels and minerals—is a growing source of conflict in rapidly developing areas of the American West, especially as the search intensifies for subsurface deposits of natural resources.

The federal government owns most of these underground resources. About 58 million acres of privately owned land in the United States are estimated to overlie federal minerals, with most of this acreage in the West.

At an RFF Issues Briefing in March, experts and stakeholders offered contrasting views on several aspects of the split estate controversy. Among the topics addressed: Can the rights of the surface owners be protected during exploration? Who decides how much these rights are worth? And if surface owners are fairly compensated, can the resource be extracted competitively? What is in the nation’s best interest as this issue emerges as part of the debate over U.S. dependency on foreign energy supplies?



Dru Bower, vice president of the Petroleum Association of Wyoming, noted that the most useful strategy is to have both landowners and operating companies build working relationships early in the process. When agreements and expectations are outlined in detail at the start of a negotiation, she said, both parties are more likely to walk away satisfied. “Responsible energy companies have no interest in harming landowners in any way,” she said.

Shaun Andrikopoulos, a cattle rancher near Jackson Hole, Wyoming, responded that past experiences of landowners had not resulted in trust-

ing relationships with oil and gas drillers. “In too many instances, landowners’ interests are overrun with take-it-or-leave-it offers that leave the land scarred and devalued,” he said. “At a time when land is becoming more valuable for its surface amenities—its views, its hunting and fishing and recreational potential, and its solitude—the gold-rush environment in the West is inevitably causing landowners to say, ‘Enough is enough.’”

To help you decide which side of the fence you sit on, you can watch a video presentation of the briefing at www.rff.org/splitestates. ■

Learning from Each Other: How the U.S. and Japan Can Share Ideas about Climate Change

William Pizer

The past several years have witnessed an increasing rift between the United States and most of the industrialized world over the course of international climate change policy. Most countries, including Japan, have ratified the Kyoto Protocol and are pursuing domestic policies to attempt to meet their commitments. The Japanese Ministry of Environment, for example, has proposed a tax on carbon emissions designed to encourage reductions and the Ministry of Economy, Trade, and Industry has proposed sector-by-sector performance standards. In contrast, the United States has withdrawn from the protocol and is pursuing a mostly voluntary approach that would, at best, bring it nowhere near its Kyoto target.

Against this divisive backdrop, RFF and the Institute for Global Environmental Strategies (IGES-Japan) convened a two-day workshop on domestic and international climate policy in February. Bringing together government policymakers, environmental and business stakeholders, and academic experts, the workshop had three goals: enhance mutual understanding of ongoing activities, economics, and politics in the United States and Japan; share ideas for potentially improving domestic policies in each country; and seek out constructive opportunities for bilateral

and multilateral cooperation.

Over the course of these two days, it was clear that great opportunities exist to improve mutual understanding of recent developments, economic analyses, and political nuance in each other's country. For example, American participants were unaware of the success of the Keidanren (the umbrella organization of Japanese business, trade, and industry groups) at exceeding required efficiency standards. Japanese participants were unaware of a key aspect of U.S. treaty tradition, that ratification cannot occur until implementing legislation is in place—a fact that made the Kyoto Protocol virtually unratifiable.

It was also clear that sharing policy ideas inevitably filters each other's thinking. For example, Japan is now experimenting with emissions trading in one prefecture. The top runner program—which requires Japanese equipment manufacturers to match the energy efficiency of the top-performing model—was recently cited as a possible model for reform in U.S. automobile fuel economy standards.

At the international level, one interesting observation from the workshop was the idea that state action in the United States often influences and provides impetus for federal action, and that this same dynamic could work at the international level. Just as some states act unilaterally,

somewhat to their own competitive disadvantage, in order to demonstrate both commitment and possibility, some nations may take unilateral (or at least not universal) action in the same way. Eventually, moral sensibility and a business interest in standardizing regulation could force wider-ranging international commitment.

A second observation is that even absent agreement on mitigation steps, there is considerable scope for technology cooperation, especially between the United States and Japan. While it is unclear how this might proceed—joint standards, commercialization policies, or research and development programs—it is a fruitful area for further work.

Most countries, even those participating in the Kyoto Protocol, are pursuing their climate policies in some degree of isolation from other countries and with differing levels of attention to their actual emissions commitment. This cannot continue indefinitely. As the global need for emissions limits tightens, responses need to be coordinated to avoid encouraging the migration of energy-intensive industries to less stringently regulated countries. The United States and Japan, with their shared history, significant trade relations, and common interest in technological solutions, are particularly able partners. Through improved U.S.–Japanese cooperation, it is our belief that global progress on responding to the threat of climate change is more likely.

This workshop was supported by the Japanese Ministry of the Environment. RFF and IGES are currently seeking funding for two additional workshops, one in Tokyo and another in Washington, to continue this dialogue over the next two years. ■

Land Trusts in the United States

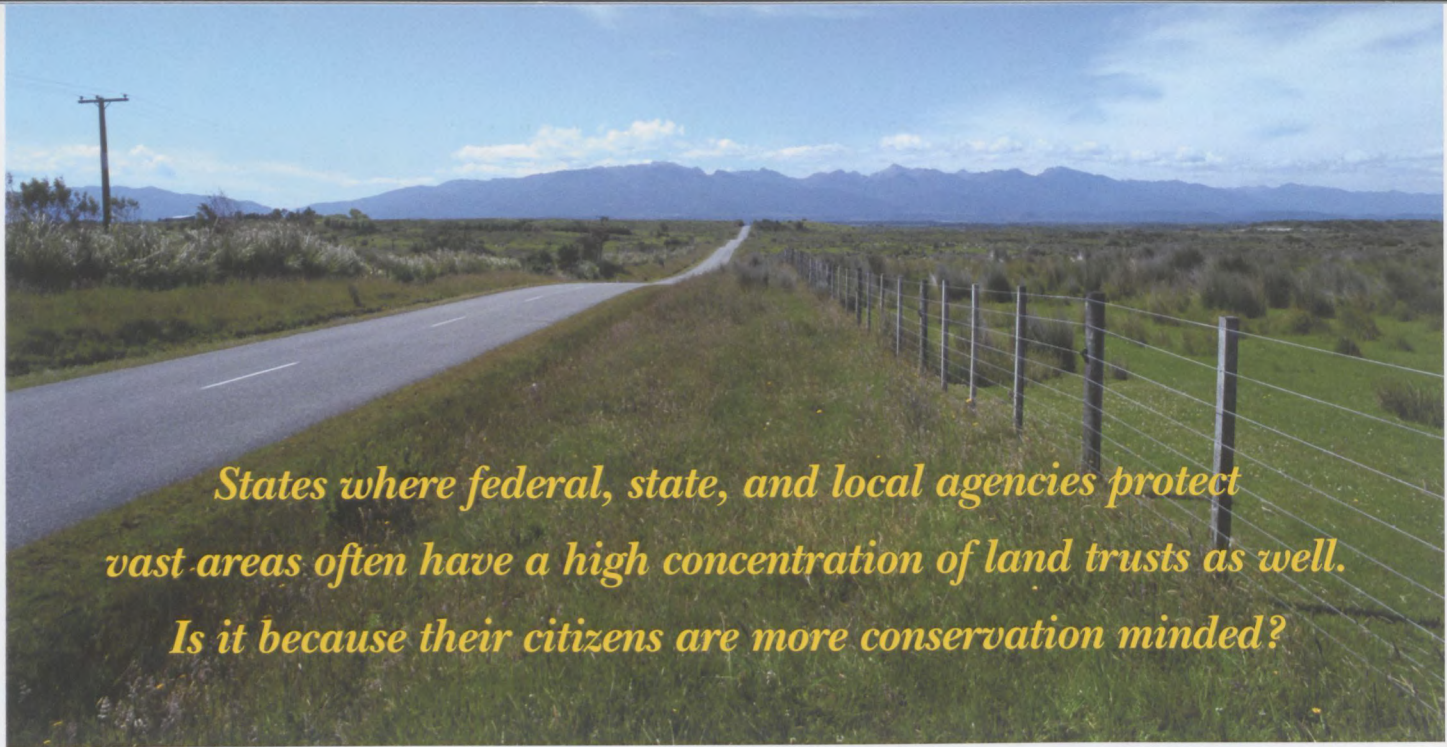
Analyzing Abundance

Heidi J. Albers, Amy W. Ando, and Daniel Kaffine

Millions of acres of forests, riverbanks, meadows, and historic battlefields have been paved over in the past 10 years. In response to this, governments at all levels have taken steps to preserve millions of acres of land. However, citizen groups across the country, feeling that this is not enough, have formed large numbers of trusts to protect even more land.

Land trusts are not a new idea. Landscape architect Charles Eliot was the impetus behind the first one in Massachusetts, which was set up in 1891 to preserve 20 acres of woodland. By 1950, there were 53 land trusts in 26 states and now, 54 years later, there are 1,200 trusts conserving more than 6 million acres nationwide.

The sharp rise in the number of land trusts—a 50% increase over the past decade—raises interesting questions. Local land trusts are finding ways to protect an average of 500,000 additional acres each year. How is this possible? How do land trusts make decisions? And why do we see so much variation in the number of trusts across states? Does that variation signal that some states have more trusts than they can handle efficiently and others may not be protecting valuable wildlife and natural resources?



States where federal, state, and local agencies protect vast areas often have a high concentration of land trusts as well. Is it because their citizens are more conservation minded?

Over the past few years we have undertaken an in-depth statistical analysis of the land trust “industry,” looking at where they are and how their number corresponds to a wealth of factors ranging from population density and total land area to voting patterns in the 2000 presidential election and the number of endangered species. We were also curious about whether the amount of government-held land being conserved had a bearing on the total number of private land trusts in a state. This would allow us to see if public agencies needed to step in to conserve land in states where there were few trusts and perhaps to coordinate among trusts in states where many splintered organizations attempt to manage diverse plots of land.

Land Trusts and the Benefits They Provide

Although all land trusts use land conservation as the mechanism to achieve their goals, the goods and services provided can be very different. Some land trusts focus on providing recreational benefits through conserving recreation areas. For example, in Maine, the Downeast Rivers Land Trust and several partners recently protected the 40-foot Saco Falls on the Pleasant River and the surrounding 14 acres for use by picnickers and hikers. Other land trusts aim to provide open space in highly developed areas. In Rhode Island, the Block Island Land Trust, the Block Island Conservancy, The Nature Conservancy, and the town of New Shoreham jointly acquired 25 acres of open space with a scenic overlook of Block Island Sound.

Land trusts also protect plant and animal species by purchasing large tracts of vulnerable habitat. In Yolo County near

Sacramento, California, a land trust bought easements on nearly 2,000 acres of contiguous farmland to serve as a bulwark against the county’s rapid development and to protect a three-mile stretch of riparian habitat along Cache Creek. Farther south, the Big Sur Land Trust and The Nature Conservancy purchased nearly 10,000 acres of land near Carmel that contains old growth redwoods and serves to connect 13 other parks and reserves.

Though land trusts often have a specific goal in mind for conservation, they provide a range of services. For example, the 14 acres conserved for picnickers and hikers along the Pleasant River in Maine also serve to protect the quality of the natural habitat of the endangered Atlantic salmon.

Location, Location, Location

The conservation benefit of a parcel of land is not simply a function of the quantity of the land in total acreage. Rather, it is a function of which pieces of land have been conserved. An acre of forestland near a stream may provide erosion control, but another nearly identical acre farther from the stream would provide fewer benefits. In addition, the number of species protected by one particular acre of land in trust may be far greater than a similar acre in another location. This variation in benefits across similar-sized parcels adds to the complexity of the decisions faced by land trusts when they decide which parcels to acquire.

The benefits of conserving particular parcels of land are interconnected with the location and number of other parcels held by land trusts. As with most goods, the benefits from conserving a marginal parcel may be low if many parcels are

already conserved. In some cases, however, such as watershed and habitat protection, there are threshold levels of land that need to be conserved to provide benefits, and if conserving a particular parcel achieves that threshold, that changes the value of all the other conserved parcels.

Further complicating decisions, the benefits from a parcel are also related to its configuration. For example, a parcel that creates a wildlife corridor between two parks would provide fewer benefits if those parks were not protected as well. Correspondingly, we see land trusts that seek to link protected lands with corridors and to purchase private land to provide “infilling” of national and state lands.

Where Are These Land Trusts?

An analysis of the private land trusts in the United States reveals a wide variation in the numbers of trusts per state. These trusts are not spread evenly around the country. The

greatest concentration is in the northeast and California. Some large states such as Alaska have very few trusts while some small ones have the most, such as Massachusetts with more than 135. (See map below.)

To the extent that specialization on niche conservation issues—protection of one local area or one particular species—is beneficial, we would expect to see more land trusts in a state. On the other hand, one large trust may be better able to coordinate benefits than several disparate ones. For example, to protect habitat for animals with large home ranges who will only move through one type of habitat, total contiguous or connected acreage is more important than it would be if the goal were to protect habitat for certain bird species, where small plots in the same general area would be just as effective.

Another interesting trend is the emergence of private organizations that aim to enable land trusts to coordinate their activities more efficiently, which signals that coordination

Number of Land Trusts by State in 1998

■ 23 to 137 (11) ■ 20 to 32 (10) ■ 8 to 20 (10) ■ 4 to 8 (8) ■ 0 to 4 (11)

SOURCE: LAND TRUST ALLIANCE



costs may be important. These examples suggest that specialization and coordination matter in determining the make-up of the land trust industry. Considering these two factors in the emergence of land trusts, is the number of land trusts in each state what we would expect it to be?

In some ways, our results were consistent with our expectations. We found more trusts in states where conservation demand is high, such as states with large populations or a pro-environment ideology. Fewer trusts turned up in states where it may be particularly costly to have a large number of trusts making independent and uncoordinated choices, such as states with roads fragmenting the remaining natural areas or with many different watersheds. There was a strong correlation between the number of trusts and large urban areas; this may reflect both high demand for conservation in such areas and a large payoff to specialization in places where land protection provides very local conservation benefits. Also, as might be expected, there were more trusts in areas where big animals, such as moose or elk, need large areas of land.

Some of our results were counterintuitive. States where federal, state, and local agencies protect vast areas often have a high concentration of land trusts as well. Is it because their citizens are conservation minded? Is it because the land provides such high benefits that demand for conservation is particularly large? Is it because holes in the government conservation network provide important high-valued niches for land trusts to fill? More study is needed before we know the answers to these questions.

Another surprising result of our study was the negative correlation between land area and land trusts. Why are there so many trusts in some tiny states and so few in some large states? This result begs some questions as well: Do economies of scale present a problem in starting trusts in large, disparate areas? Or is it that larger states may be more sparsely populated and don't feel the pressure to preserve the way a smaller, more populous state might?

We determined that there were fewer land trusts in states with many endangered species. One potential reason why is that protecting endangered species requires picking the right plots, not just the right number of plots. Such coordination might be better accomplished by a single trust than a group of trusts. Another factor to consider is the possibility that, while some trusts do focus on protecting one particular species, most consider endangered species protection to be the responsibility of the federal government and so there aren't "enough" trusts overall.

Our results address only the number of land trusts. To be confident that enough conservation is being undertaken in

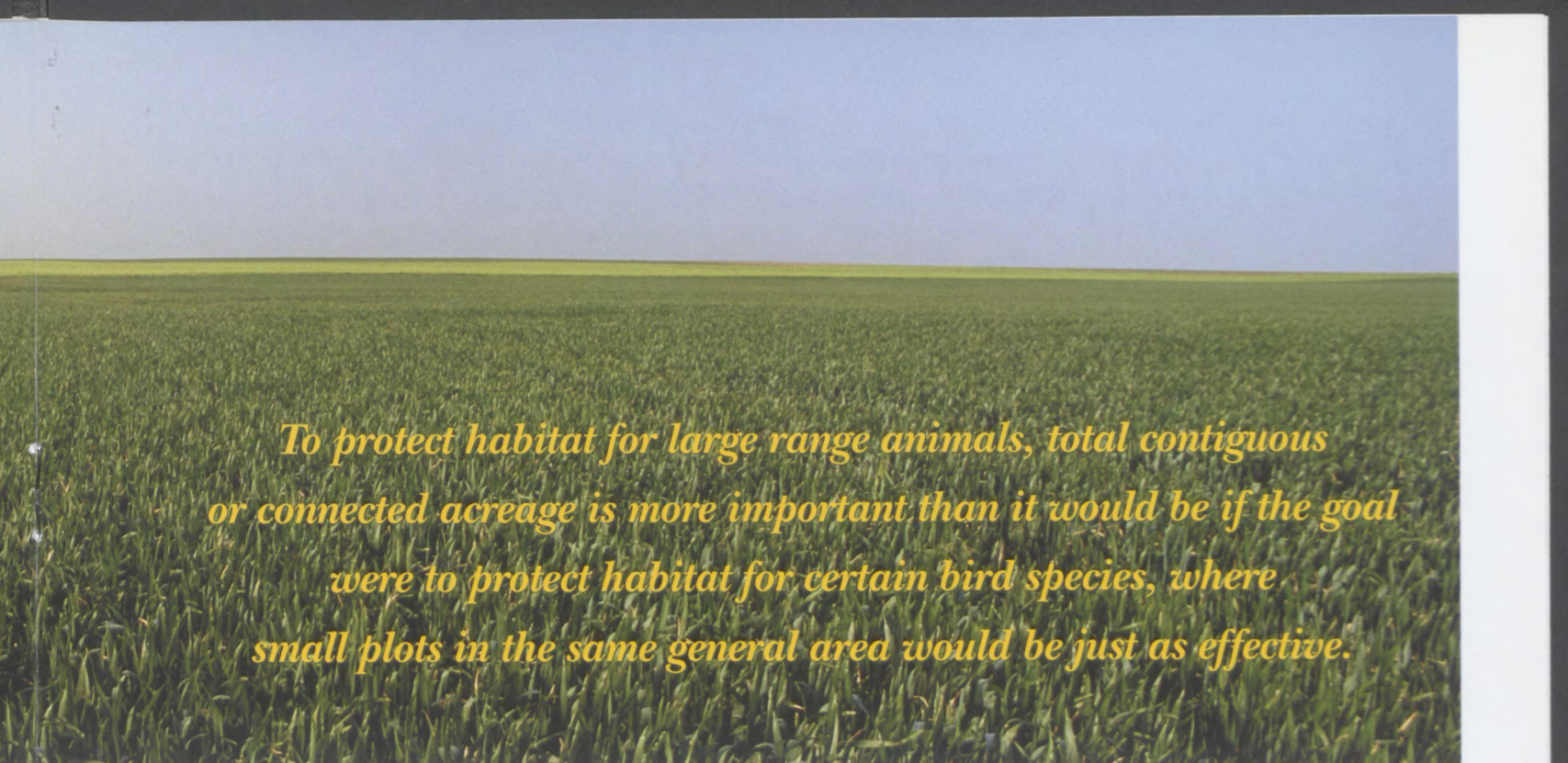


states with many endangered species, further investigation of the amounts and types of land being conserved is necessary. For example, states like Tennessee and Alabama have relatively few land trusts for the number of threatened species but many of these species are mollusks, and land trusts may not be an appropriate mode of conservation for such species. Hawaii also has very few land trusts but those (both local and national) operating there may have large enough holdings to generate the right amount of conservation benefits.

Our analysis shows that fewer trusts will be more efficient in providing these benefits due to coordination costs. These results regarding land trusts and plant and animal species call for further analysis to ensure that the levels of conservation are appropriate. Many organizations, such as The Nature Conservancy and Conservation International, are calling for more conservation in "hotspots"—areas with many endangered species, which causes us to wonder whether many trusts or few trusts can best provide protection for these species.

More Trusts in the Future

This study of the variation among number of trusts around the country answers some questions and raises others. Yet as we examine the role of coordination costs, the results lead us to believe that this seemingly odd distribution does make sense, at least economically. In addition, we see anecdotal evidence of trusts considering or encountering coordination



To protect habitat for large range animals, total contiguous or connected acreage is more important than it would be if the goal were to protect habitat for certain bird species, where small plots in the same general area would be just as effective.

costs and specialization benefits, lending credence to our model and analysis. The results showing a positive correlation between government-protected land and the number of land trusts, and the fact that coordination costs appear to be significant, point to a potential role for government to provide land “seeds” for other trusts to grow from and to provide for assistance in coordination between land trusts.

What Charles Eliot and like-minded people started in Massachusetts more than 100 years ago with the nation’s first land trust continues to flourish. As the amount of land under development grows annually—the U.S. Department of Agriculture’s Natural Resources Conservation Service estimates 2.2 million acres were paved over between 1997 and 2001 alone—the number of people wanting to conserve it also grows. Some regions of the country are increasing the area under land trusts exponentially. States in the Southwest—Arizona, Colorado, New Mexico, and Utah—increased their protected land by more than 1,600% in the past 10 years and the south-central states—Louisiana, Arkansas, Oklahoma, and Texas—increased theirs by more than 1,300%.

In our current research, we are digging more deeply into how land trusts make conservation decisions, with particular emphasis on the spatial aspects of conservation benefits and the role of government in inducing private conservation. This project, funded by the National Science Foundation, combines numerical modeling with empirical analysis and will identify situations in which strategic land purchases by the government and promotion of coordinated actions among public and private groups encourage socially desir-

able patterns of land conservation by private trusts. We hope this body of work will help policymakers and land trusts to find new strategies that translate conservation expenditures into greater levels of conservation benefits. ■

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Further Readings

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Brownfields Policy Reform in Wisconsin: A New Regulatory Culture

Kris Wernstedt & Robert Hersh

Much of the responsibility for environmental oversight has shifted downward from the federal to the state and local levels over the past decade. Perhaps nowhere else do these devolutionary currents run so strongly as in initiatives to revitalize "brownfields." These are properties that contain abandoned or underused facilities where expansion or redevelopment is complicated by real or perceived contamination.

Brownfields number in the hundreds of thousands nationwide, perhaps as many as a million sites according to some estimates. They include former or current manufacturing establishments, gas stations, mines, transportation facilities, landfills, dry cleaners, and sites where hundreds of other activities may have generated contamination. And they are found in urban, suburban, and rural settings, occupying parcels smaller than the average home lot, covering entire city blocks, or sprawling over thousands of acres.

What forces and institutions have shaped the development of state programs to clean up and redevelop brownfield sites? Where has program innovation taken place and why? What obstacles to brownfields redevelopment remain? The answers obviously may vary by state. But as a starting point, and with the support of the Andrew W. Mellon Foundation, we have examined in detail the implementation of cleanup and redevelopment initiatives under one state's efforts, the brownfields program in Wisconsin. The state offers not only an extensive track record of redeveloping different types of brownfield sites but also a wide range of program incentives and tools to promote contaminated site cleanup and encourage public and private parties to talk about the program. This latter has been particularly impor-

tant since our study rested on detailed interviews of more than 70 individuals from the public, private, and nonprofit sectors in Wisconsin, in addition to a survey of more than 250 individuals from around the state.

Background

Traditional federal regulatory approaches to contaminated land have tended to discourage private parties from becoming involved in brownfield sites, thus both curtailing needed site assessments and cleanups and damping economic opportunities. The 1980 Comprehensive Environmental Response, Liability, and Compensation Act (CERCLA), referred to more colloquially as the Superfund law, is typically identified as the culprit. The liability provisions of the law touch a wide array of parties and hold them liable for cleanup costs. Moreover, during the 1980s and 1990s many states passed "mini Superfund" laws, which typically addressed sites that posed smaller risks to human health and the environment or those that may have fallen outside the CERCLA realm. In some cases, however, the state laws have broadened the range of substances that require cleanup.

Fearing the tangled web of federal and state liability, owners, developers, and prospective purchasers of properties that are even thought to be contaminated have shied away from property transactions that might attract regulatory attention. As a consequence, the unattended contaminated sites may threaten public health and the environment, depress local economies, and push new development to rural or greenfield sites. In the face of these problems, the prospective benefits

for communities of revitalizing contaminated and underutilized properties are significant.

For example, the nearly 100 local planners and economic development officials in Wisconsin included in our survey clearly support such revitalization. More than three-quarters of these respondents indicated that traditional economic development objectives of infrastructure use, tax revenues, and job creation were "important" to "very important" reasons to redevelop contaminated properties. Other benefits—such as reducing environmental and public health risks, and removing eyesores—also attracted a high percentage of respondents.

With such potential benefits why do so many brownfield sites in Wisconsin and elsewhere remain underutilized? Clearly some properties may be undesirable regardless of contamination, simply because of poor real-estate fundamentals. They may offer insufficient acreage to host some types of activities, suffer from inadequate transportation connections, lie in poor locations with respect to potential customers, lack ready access to a skilled labor pool, face opaque or onerous local permitting processes, or simply lie in a depressed regional real estate market. If contaminated, the cost of cleanup may actually exceed the market value of the property.

The liability provisions of CERCLA and state laws can sharpen these disadvantages to the extent that they impose uncertain liabilities for cleanup on parties that may not have contributed to the contamination in the first place. Municipalities, in particular, may be caught in a bind. Abandoned and contaminated properties may appear ripe for tax foreclosure and redevelopment, but the risk of taking ownership and being stuck for cleanup and possible legal claims by adjacent landowners and other parties may outweigh potential gains.

Brownfields Reform

Many different interests have tried to reform CERCLA and its state equivalents almost since the inception of the statutes. The main thrust for these reform efforts has been to reduce liability burdens and to provide incentives that could encourage more risk taking in the real estate market by public and private sector entrepreneurs. At the federal level, these pressures ultimately resulted in the 2002 Small Business Liability Relief and Brownfields Revitalization Act, which provides conditional liability relief to some parties involved in brownfield properties, as well as up to \$200 million annually for site assessment and cleanup grants, and up to \$50 million annually for support of state response programs.

Well before Congress's action, many states had moved off the mark in the 1990s and passed legislation to curtail the reach of their own liability provisions. Their actions typically

have scaled back environmental requirements by tailoring cleanup requirements to the expected future use of the properties rather than requiring, for example, the same cleanup at a parcel whether it is slated for development as an industrial park or as a playground. Many also provided some form of liability release upon state approval of cleanup and offered incentives to spur private interest. All but a handful have developed formal voluntary cleanup or brownfield programs that operate in a less burdensome and more voluntary fashion to proactively encourage redevelopment.

In Wisconsin, many of these reforms were embodied in the 1994 Land Recycling Act. This law exempted many parties from cleanup liability under certain circumstances and created incentives for municipalities and private parties to acquire, clean up, and redevelop contaminated real estate. Under the law, a municipality could become exempt from cleanup obligations if it acquired contaminated property through tax-delinquency proceedings or as a result of an order by a bankruptcy court, didn't exacerbate the problem, and met several requirements related to site access and investigations. Lenders received a similar exemption if they took title to a contaminated property through enforcement of a security interest in the property.

Purchasers of contaminated sites, in perhaps the most far-reaching aspects of the legislation, could receive exemptions for future liability by following a prescribed process laid out in a set of administrative rules from the state's Department of Natural Resources (DNR). Subsequent changes to the law through the state's biennial budget bills of 1997, 1999, and 2001 broadened eligibility for liability relief to include even culpable parties and made it possible for owners to receive a certificate of completion from DNR stating that no additional action would be required at the site even if the remedy fails or standards change.

At the same time that detailed cleanup requirements were developed to encourage interest in brownfield sites, a DNR advisory group that began to meet in 1995 suggested that the department embrace the concept of remediating contaminated lands for beneficial reuse and that it partner with an array of brownfield reuse interests. Its recommendations, though rather diffidently stated, called for a profound change in the way DNR staff would have to work with the private sector to return sites back to productive use. Not only would the timing of a cleanup decision have to be made to help facilitate real estate transactions, but also DNR officials were expected to consider the welfare of the community in which the site was located.

Several years later, the state legislature directed the DNR to form a brownfields study group to evaluate the state's

brownfield initiatives. This group—comprised of lawyers, local mayors and economic development officials, planners, representatives of community-based organizations, and others—has become the most important source of ideas and innovation in state brownfields policy. It has recommended scores of programmatic innovations that have been put into effect, including the provision of state funds for site assessments, cleanup, and redevelopment; new local financing mechanisms to encourage brownfields development; liability relief for municipalities and private parties; and reforms that allow cleanups that rely on natural processes to be certified as complete even before the contamination drops below enforcement levels.

The DNR transformations engendered by these legislative changes and recommendations of the study group represent a profound shift in regulatory culture. Table 1 illustrates the perceptions of more than 250 Wisconsin individuals experienced in contaminated property work—representing local government, private firms, and the nonprofit sector—about changes in the department's behavior since the mid-1990s. Over half of the respondents indicated a change for most of the listed behaviors. And typically far more respondents perceived shifts that would be viewed positively by proponents of regulatory reform—more flexibility, more willingness to negotiate, and more innovation, for example.

Where to Reform?

Brownfields innovation remains a wide-open area, with ample agreement on the room for further reform but some differences on just what changes are desirable. Table 2 highlights the views of survey respondents on constraints that developers still face in redeveloping contaminated property. (Because several of the constraints relate to government performance, we excluded public-sector respondents from the table.)

More than half of respondents indicated that cleanup costs continue to be an obstacle, meaning many contaminated sites likely will remain unattractive for development absent public subsidization. In addition, nearly one-third of the respondents called cleanup approval a "very important" constraint. This also reflects a cost consideration since longer approval periods make the cash flow of a redevelopment project less appealing. In contrast to this strong sentiment, agreement on the next two factors most frequently identified as being a constraint—both related to concerns about site liabilities—is less striking. Only a quarter of the respondents indicated that one or the other is a very important constraint and only

Table 1:
Behavior of Wisconsin DNR

In comparison to the mid-1990s, the behavior of the Department of Natural Resources with respect to contaminated properties TODAY is:

Percentage of Respondents Indicating Change

BEHAVIOR	MORE	LESS	NO CHANGE
Flexible	48%	23%	28%
Willing to negotiate	45	19	37
Innovative	40	17	43
Insistent on strict adherence to cleanup standards	38	18	44
Easy to work with	36	23	41
Fair	36	13	52
Likely to apply sanctions	36	20	44
Trusting of private parties	31	16	52
Reluctant to use threats	30	20	51

Based on 262 responses from the public, private, and nonprofit sectors

Table 2:
Factors Constraining Brownfields Redevelopment

FACTOR	PERCENTAGE OF RESPONDENTS SELECTING "VERY IMPORTANT"
High cost of cleanup	53%
Length of time needed to get cleanups approved	31
Possible U.S. EPA involvement	24
Possibility that additional cleanup will be required in the distant future	23
Complexity of cleanup standards	16
Unfavorable lending terms	15
Inconsistencies in cleanup standards	14
Lack of cooperation from local government	11
Community opposition	4

Based on 112 responses from the private and nonprofit sectors

slightly more respondents indicated that one or the other is a minor constraint.

What does this suggest about the need for additional changes? It may be too soon after passage of the 2002 federal brownfields law to detail possible revisions to it, particularly since much of its associated regulatory language and guidance is still being hammered out. In addition, on-the-ground brownfields redevelopment is arguably driven more by state and local regulatory and financial inducements than by their federal equivalents. Still, based on our work in Wisconsin we can offer the following recommendations about how brownfields policy can be pushed forward.

More Assessment and Cleanup Money. Public financial support for assessment and cleanup will never be a panacea for all that ails brownfield properties. In many cases, it would be a poor investment relative to other pressing needs. However, tens of thousands of properties around the country would be substantially more attractive if cleanup costs were subsidized or, in some cases, just known with greater certainty. At the local level, tax increment financing can help; this is a process by which a local government can designate an area for redevelopment and devote the resulting increase in property taxes to paying off public investments in cleanup and infrastructure. However, such financing may be unavailable for legal, political, or fiscal reasons, or simply because property taxes contribute relatively little to a local jurisdiction's budget. Owner-financed tax increment financing—wherein an owner rather than a municipality takes on the risk of the failure of a development to generate new taxes—also may be feasible. General bonding, already providing brownfield funds in several states, may be an additional option. At the federal level, modest modifications or extensions of tax incentives targeting brownfields could improve brownfield project economics. Perhaps most radically, reauthorization of the currently lapsed federal Superfund tax could prove more politically palatable if a portion of the revenues were dedicated to leveraging municipal or state resources grant programs for brownfields cleanup.

Forums for Dialogue. The brownfields study group drove brownfields policy forward in Wisconsin. Can this process be repeated elsewhere? At the national level, such an approach is likely unrealistic, because of geographic distances, the contentious and partisan atmosphere of environmental policymaking in Washington, and procedural requirements that make informal, give-and-take dialogue difficult to pull off. Many states, however, face fewer constraints to running such inclusive study groups. Modest support would be required—both for agency staff time and, learning from the Wisconsin model, to encourage participation by traditionally under-

represented groups with limited resources to attend distant meetings—along with a willingness to meet regularly over a long time period.

Areawide Brownfields Revitalization. Interest in brownfields has spilled beyond the confines of a narrow group of experts and expanded impressively in the last five years, as witnessed by proliferating initiatives at the federal level and in almost every state, hundreds of successful brownfields redevelopments and thousands of attendees at recent national brownfield meetings. With only a few exceptions, however, brownfield redevelopment efforts address contaminated sites property-by-property within a community. An alternative approach would be to undertake a larger-scale endeavor to revitalize multiple properties across a wider area. Such an areawide approach could promise a high enough increase in property values to make it attractive for property owners, prospective purchasers, and developers to invest in remediation and redevelopment, tying revitalization to more comprehensive redevelopment objectives and taking advantage of economies of scale in remediation and infrastructure provision.

Successful future brownfields reforms will likely proceed as in the past, through trial-and-error efforts by entrepreneurial stakeholders who both sculpt innovations as they appear and recycle these back through the policy process for reformulation. Such experiments can help brownfields practice continue to grow toward a healthy integration of economic and environmental policy.

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For More Information

The above discussion is based on three RFF discussion papers by the authors. All are available at www.rff.org/brownfields.

The Brownfield Bargain: Negotiating Site Cleanup Policies in Wisconsin. RFF Discussion Paper 03-52.

Brownfields Redevelopment in Wisconsin: Program, Citywide, and Site-Level Studies. RFF Discussion Paper 03-53.

Brownfields Redevelopment in Wisconsin: A Survey of the Field. RFF Discussion Paper 03-54.

For more information on brownfields, see the websites of the following organizations:

International City/County Management Association (www.icma.org)

Northeast Midwest Institute (www.nemw.org/reports.htm#brownfields)

U.S. Environmental Protection Agency (www.epa.gov/brownfields)

Wisconsin Department of Natural Resources (www.dnr.state.wi.us/org/aw/rr)

For collections of research papers, see:

Center for Environmental Policy and Management, University of Louisville (www.cepm.louisville.edu/publications/BSGRG/bsgrgpubs.htm)

National Center for Neighborhood and Brownfields Redevelopment, Rutgers University (<http://policy.rutgers.edu:16080/brownfields/>)

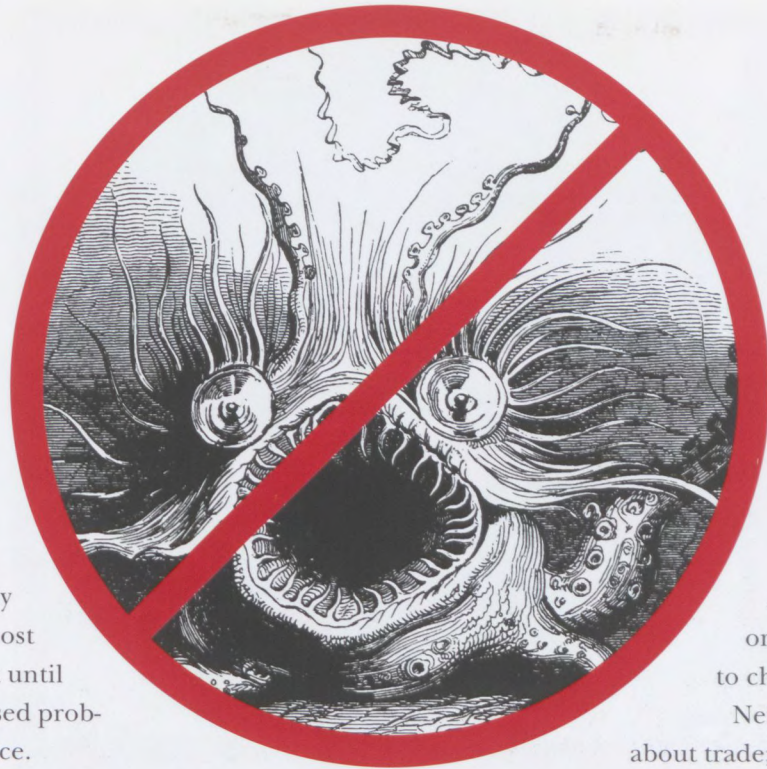
FENDING OFF IN- VASIVE SPECIES: CAN WE DRAW THE LINE WITH- OUT TURNING TO TRADE TARIFFS?

M I C H A E L M A R G O L I S

Next to habitat loss, the main threat to endangered species is the spread of other species. The introduction of goats onto San Clemente Island, California, for example, has led to the extinction of eight plant species and threatens at least eight more. Most of the American chestnut trees are now gone, due chiefly to a fungus known as chestnut blight. And when the great African snail became a serious garden pest in Hawaii, the rosy wolf snail was introduced to prey upon it and wound up instead eradicating several other snail species native to the islands it was supposed to protect.

Hundreds of these “invasive species” have by now been identified, and the damage they do is not limited to biodiversity. Mollusks foul industrial water-intake systems and navigation routes, numerous pests ravage crops, and the spread of European cheatgrass in the American West has contributed to the increase of fires. Other invasive species cause large changes in ecological processes such as the flow of nutrients and the amount of light reaching lake bottoms or forest floors.

This new ecological reality is part of the price of prosperity, a side effect of large-scale production, trade, and travel. Invasive species spread along the landscape disturbances created by roads, railways, and canals, and they also travel across oceans clinging to ship hulls or hiding in bilge water or packing material. While many invasive species have been introduced intentionally by people who had no idea they could cause harm, most invaders arrive in their new homes by accident. Agricultural shipments, especially those



of live plants, often include insect eggs or fungal colonies that are extremely difficult to detect. In most cases, no one thinks to look until a particular species has caused problems somewhere at least once.

In fighting the spread of invasive species, national boundaries are an appealing line of defense. Goods and people crossing those boundaries are under some scrutiny in any case and are generally restricted to a few entry points. In the United States, most trade and travel involves transportation across oceans, which means many of the life forms arriving at ports would almost never appear in the natural course of their own movements. Preventing problem species from arriving in the country has so far been the main focus of federal efforts, and environmental activists interested in the question mostly want to see more of the same. Bans are currently being sought on both the importation of logs that have not been heat-treated and on the use of solid-wood packing materials (chunks of wood used to prevent cargo from unpredictable shifting that can damage it), both of which are common pathways for forest pathogens. Others urge a crackdown on the importation of live organisms.

GUARDING OUR BORDERS

If the kind of crackdown environmental groups now want is attempted, we can expect a second generation of trade-environment conflicts, this one potentially much harder to resolve than the previous. The first time around, green groups were caught by surprise when conservation efforts ran up against trade agreements. The cases that have aroused the most passion are the 1991 ruling that the United States could not restrict tuna imports to protect dolphins and the rather

belated discovery that the North America Free Trade Agreement had given investors a new venue through which to challenge regulations.

Neither of these cases is really about trade; they are about regulatory jurisdiction, and what led to the anger is that ac-

tivists kept finding that the jurisdiction was not where they had thought it was. All they really needed to do was learn some new law and craft proposals with trade law in mind for the bulk of that conflict to disappear and, by and large, that's what happened. In the invasive species case, however, the nature of the threat to the environment stands in direct opposition to the very purpose of trade agreements.

International trade is not the sole source of the problem. Trade between regions—say, the East Coast and California—can also spread invasive species, and efforts at prevention have proceeded with no special difficulty because the federal government has unquestioned authority to regulate interstate commerce and has chief responsibility for preventing the spread of invaders. On the international scale, however, that responsibility is largely in the hands of national governments, and there is no institution with equal power over trade among them.

THE TROUBLE WITH TARIFFS

To appreciate the difference this makes, one must consider what the World Trade Organization (WTO) and related international organizations actually do. Anyone who has casually studied international trade has probably wondered why these institutions are needed. After all, free trade is in the interest of every country; why not skip all the negotiating and just let goods flow freely?

That would, in most cases, be best for consumers, but it is



politically impossible. The reason is that the benefits of a barrier to imports are enjoyed by relatively small groups of people, while the costs are spread over the whole consuming public. Few consumers can be troubled, for example, to complain to their representatives that sugar costs twice what it would under free trade, but the sugar producers happily support a full-time office dedicated to keeping it that way. The well-known virtue of free trade implies that the extra cost paid by American consumers for sugar is actually somewhat greater than the extra profit earned by the producers; however, because it amounts to only a few dollars per month for any family, the domestic political process is unlikely ever to get rid of America's sugar quota system.

International trade talks offer a way around this tension. Every trade barrier harms both buyers and sellers, and if the buyers are a scattered group in one country, the sellers are probably a concentrated group in the other. The United States, in seeking to open markets for producers with influence in Washington, is also generating a benefit for foreign consumers, while American consumer interests are represented by the negotiating teams from other nations. By swapping access to each other's markets, trade negotiators have been able to move the world haltingly and partially towards the free trade ideal.

Once nations have agreed on what kind of market access to grant each other, they must agree how to guarantee that access. The simple part is to get rid of the tariffs and quotas that were explicitly designed for no other purpose than to interfere in trade. It is much harder, however, to deal with policies that discourage trade but also serve a clear social purpose—such as keeping out invasive species. Getting rid of the policies openly designed to discourage trade does nothing to

get rid of the political dynamic that gave rise to those policies. So how do those political forces play out?

INTEREST-GROUP INFLUENCE

Jason F. Shogren, of the University of Wyoming, and I have developed theoretical models to answer that question, building on a model of interest-group influence that has been widely used to explain which industries get tariff protection. In these models, government officials are assumed to care both about the general welfare and campaign contributions. The cynical interpretation of this theory is that incumbents care only about getting reelected, the probability of which depends on how well-off voters feel and how much campaigns can spend on propaganda. A more charitable view is that they want to do what is right for the society, but are aware that they can lose the ability to do so by being outspent.

The damage done by invasive species that enter via imported goods alters the general-welfare component of the government's objective but has no direct impact on the private interest groups. It does, however, indirectly alter interest-group behavior. If you represent an interest group that wants a particular import discouraged, and you know the government is going to put high tariffs on that import anyway because it carries invaders, you can save your contributions, while if you wanted free trade in that good you must contribute. The result of all these calculations is a tariff that is greater or less than the socially optimal tariff depending on the industry incentives to lobby.

What this implies is that if governments agree in trade talks to eliminate tariffs, but leave in exceptions for the goods that harbor invasive species, they almost might as well not have bothered. Unless governments can also agree on how

Invasive species spread along the landscape disturbances created by roads, railways, and canals; they cross oceans clinging to ship hulls or hiding in bilge water or packing material.

potential invasive species damage is to be valued—which has not been contemplated in any trade agreement so far—the tariffs on those goods will rise far beyond what the damage done can really justify. And virtually every import can be a pathway for some undesirable species.

In practice, trade agreements have addressed this sort of problem not by allowing for tariffs, but by allowing regulation of the import process. For example, banning the import of logs from locations not certified as free of certain pests, or requiring that logs from such locations be heat-treated, is allowed under current agreements. Such policies have the clear advantage of focusing more narrowly on the problem than do tariffs. But it turns out that as a way to prevent protectionist abuse, this approach is not much better, and in some cases may be worse, according to our ongoing research. If there are no restrictions placed on how stringently governments set the importation standards or inspect for compliance, the import-competing lobbies will seek to have inspections increased to levels that drive import prices about as high they would have been with tariffs. Consumers may wind up even worse off than with tariffs, since the price-gauging function is now being performed by the use of real resources—to wit, the excess time spent by the inspectors.

Trade negotiators have been aware of these problems for some time. By the time the WTO was formed, there had been many cases in which importers alleged bad faith. As a result, the WTO founding documents include an Agreement on Sanitary and Phytosanitary Standards (SPS). According to the agreement, regulations intended to protect the health of animals and plants must have a scientific basis, but it turns out not to be so easy to agree on what that means. At present, the

European Union is putting up with tariff retaliation rather than conceding that its ban on hormone-treated beef is unscientific, and the same may soon hold for genetically modified

foods. And these issues, like almost every SPS case decided so far, have arisen in the context of agricultural trade, which is by far the least free trade on the planet. With explicit quotas and tariffs still in place, farmers have relatively little incentive to use standards as disguised protectionism. If, as seems likely, the invasive species issue begins to implicate more economic sectors where quotas and tariffs have been taken off the table, the clashes can only be louder and more frequent.

ALTERNATIVES TO TRADE INTERVENTION

Once an invasive species gets started somewhere, there are a variety of strategies available to keep it in check. As already mentioned, sometimes another species is brought in to prey on the invader; often species that are innocuous in their home become invasive when transported because they escape from the predators with which they co-evolved. The snail example cited above is one of many cases in which such “bio-control” strategies have gone awry, but the science is evolving and, in some situations, releasing predators is still deemed the best response. Other options include chemical treatments, the release of sterilized specimens of the invader itself (to distract mates from the fertile) and manual removal of invaders from the field. The last option is preferred for its minimal impact on the environment, but tends to be expensive.

For manual removal to be truly effective, it is critical to interrupt an invasive species’ life cycle at just the right point. In separate work with biologists Jennifer Ruesink and Eric

Every trade barrier harms both buyers and sellers, and if the buyers are a scattered group in one country, the sellers are probably a concentrated group in the other.

Buhle of the University of Washington, we have adapted an analytical strategy first developed for identifying the life cycle phase at which an endangered species most needs to be protected. The main difference is that rather than defending this weak spot in the invasive species, we wish to attack it. Typically, invasive species have short life spans and produce many offspring. Killing adults is ineffective as compared to killing the same percentage of juveniles, eggs, larvae, and so on.

There is, however, a second way in which invasive species are not just endangered species turned backwards. To protect an endangered species, we must succeed at every stage of the life cycle. To get rid of an invasive, we must only succeed at one stage. This frees us to adapt our strategy much more aggressively to the relative cost of intervention at each stage, which makes quite a difference. In many cases, killing off a given percentage of the adults is much less expensive than getting the same fraction at the other life stages, since adults tend to be larger and easier to find. This is the case for the Japanese oyster drill, a species of wrinkle infesting farmed and wild oysters on the West Coast. If the relative cost is ignored, analysis of the oyster drill life cycle indicates one should gather eggs; however, when cost is considered, the most effective approach is to concentrate all resources on gathering adults.

This lesson does not extend to all species—it matters greatly that in this case the adults do not move around a lot—but the analytical method does. This is but one component of a large ongoing effort by biologists and economists to design efficient strategies to combat invaders. For the foreseeable future, however, there will be no substitute for keeping them out in the first place, and the global trade

system remains ill-prepared to deal with the consequences. ■

Michael Margolis is an RFF fellow. Trade and the environment, especially trade between rich and poor nations, is the focus of his research agenda.

FURTHER READINGS

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Bailey, El-Ashry, Mantell, and Sillerman Assume Seats at RFF Board Table

An attorney and former assistant secretary of energy, a geologist who headed an innovative international NGO, an attorney specializing in conservation strategies, and a senior media and entertainment executive with a commitment to education and the environment are the newest members of the RFF Board of Directors. Each will serve a three-year term.

Vicky A. Bailey is a partner at Johnston & Associates, a Washington, DC, government relations firm, former Assistant Secretary of Energy for Policy and International Affairs, and former president of PSI Energy Inc., in Indianapolis. In April, Ms. Bailey stepped down after nearly three years at the U.S. Department of Energy. During her tenure, she served as the primary policy advisor to the secretary on international and domestic energy policy matters. Her responsibilities included coordinating the development and implementation of an international energy policy, and monitoring of energy policy, market trends, investments, and trade issues for their potential impact on U.S. national security, foreign policy, and trade policy objectives. She also developed strategies to promote President Bush's National Energy Policy.

She previously served as the president of PSI Energy Inc., Indiana's largest electric supplier and the Indiana operating company of Cinergy Corp. From 1993 to 2000, she was a

member of the Federal Energy Regulatory Commission and served as a commissioner on the Indiana Utility Regulatory Commission from 1986 to 1993. She was a member of the executive and electricity committees of the National Association of Regulatory Utility Commissioners. A native of Indianapolis, she is a graduate of Purdue University.

Mohamed El-Ashry is the former chairman and CEO of the Global Environment Facility (GEF), which he led from 1991 to 2002. Working with the private sector, international aid agencies, and other NGOs, GEF supports projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants.

Under El-Ashry's leadership, GEF grew from a pilot program with fewer than 30 member countries to the largest single source of funding for the global environment, with 173 members. During his tenure, it allocated \$4 billion in grants and leveraged \$12 billion in additional financing for the environment, growing to encompass more than 1,000 projects in some 140 countries.

El-Ashry came to GEF from the World Bank, where he was the chief environmental adviser to the president and director of the Environment Department. Previously, he had served as senior vice president of the



VICKY A. BAILEY



MOHAMED EL-ASHRY

World Resources Institute and as director of environmental quality with the Tennessee Valley Authority. He has also held numerous teaching and research positions. He was a senior environmental adviser to the U.N. Development Programme and a special adviser to the secretary general of the 1992 U.N. Conference on Environment and Development.

El-Ashry received his B.S. degree with honors in 1959 from Cairo University and a Ph.D. degree in geology in 1966 from the University of Illinois. He is a fellow of the Geological Society of America and the American Association for the Advancement of Science and is the author of three books and more than 200 papers.

Natural and cultural resources issues and strategic conservation philanthropy are the focus of Sacramento attorney **Michael Mantell's** practice. In 2000, he founded Resources Law Group, LLP, a multidisciplinary firm that specializes in resources law and policy. Mantell advises the David and Lucile Packard Foundation and helps administer its Conserving California Landscapes Initiative, which supports groups that buy land or easements for conservation purposes and develop land-use practices and policies. Some of the initiative's restoration and stewardship grants have been used to help protect salmon and steelhead in the Sierra Nevada.

From 1991 until mid-1997, Mantell served as California's undersecretary for resources. In that position, he developed and implemented resource priorities for the state.

Previously, as the general counsel of the World Wildlife Fund, Mantell oversaw legal and congressional matters and worked on international debt-for-nature deals. Before that, he directed the Land, Heritage, and



MICHAEL MANTELL



ROBERT F.X. SILLERMAN

Wildlife Program of the Conservation Foundation.

Mantell graduated from the University of California at Berkeley and the Lewis and Clark College Law School.

Robert F.X. Sillerman is chancellor of Southampton College (a campus of Long Island University) and chair and CEO of the Sillerman Companies, a New York communications management corporation formed in 1985. When Sillerman was executive chairman of SFX Broadcasting in the early

1990s, he rapidly expanded the company's holdings to include ownership or operation of more than 80 radio stations. In August 1997, Sillerman negotiated the sale of the company's radio business for \$2.1 billion and spun off a live entertainment business, creating SFX Entertainment—now the world's largest producer, promoter, and presenter of live entertainment. In March 2000, SFX entered into a merger agreement with Clear Channel Communications, Inc.

Sillerman is actively involved with the Museum of Television and Radio, as a member of its board of directors and as an underwriter of its traveling exhibitions program. Sillerman also serves as a member of the business committee of the Metropolitan Museum of Art, and through his family foundation, the Tomorrow Foundation, he supports educational and environmental programs.

In April 1993, Sillerman was elected to the Long Island University Board of Trustees and appointed chancellor of its Southampton College and Friend's World Program, which maintains campuses around the world. Putting his business experience to work for the college, he organized what has become a leading event in the music industry, the college's annual All for the Sea Concert. It's not quite Woodstock—members of that generation now purchase VIP tickets that entitle them to a tent party, catered food, and seating at reserved tables—but the music is classic. Bob Dylan, Jimmy Buffett, Tina Turner, Tony Bennett, and many others have drawn thousands of concertgoers and raised millions of dollars for the college's environmental and marine sciences programs.

Sillerman received his B.A. degree in political science magna cum laude from Brandeis University. ■

Book Review

True Warnings and False Alarms: Evaluating Fears about the Health Risks of Technology, 1948-1971
Allan Mazur, RFF Press

J.W. Anderson

You open the newspaper, and there you find a dire warning of another newly discovered threat to public health. How seriously should you take it? What are the chances that the warning is well founded? Are there any clues in the story to guide your judgment?

Allan Mazur of Syracuse University's Maxwell School pursues those questions in his book, *True Warnings and False Alarms*, recently published by RFF Press. He bases his inquiry on 31 cases identified by an earlier researcher, Edward Lawless, as controversial public issues between 1948 and 1971. Mazur's reason for using cases a generation in the past is that, with time and deepening knowledge, judgments on many of them are different from those of 1977, when Lawless's book appeared.

Mazur finds that 18 were valid warnings based on real threats to health. And 13 were not. Looking for a pattern, he classifies these claims by the nature of the sources and circumstances.

"Usually from their earliest moments," he concludes, "valid warnings looked different from those eventually judged mistaken. Alarms more often turned out to be true when their news source was a report of normal scientific research produced at a recognized scientific institution than when the source was a government

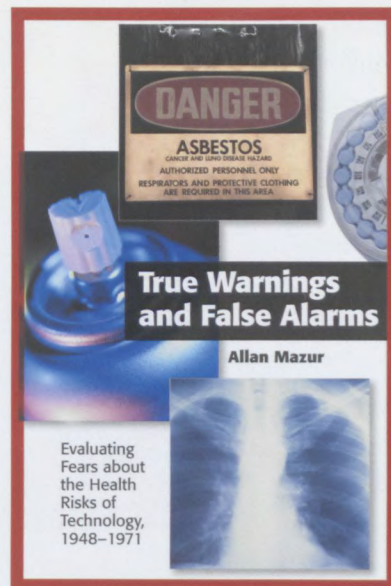
agent or citizen advocacy group."

Warnings were more likely to be true, he continued, if they appeared in isolation, rather than in an atmosphere already charged with news of other health threats.

But the character and volume of the news coverage seemed to have no relation to the truth of the claim that it conveyed. "Hyped warnings, those for which sources or journalists made unusual efforts to increase news coverage, were no more or less likely to be valid than warnings given routine treatment by the media," he found.

The message contained in Mazur's analysis is not as simple as it might seem at first glance. For example, the claim that DDT was a carcinogen to humans, as well as harmful to a wide

Controversy over health and the environment usually takes place at the outer frontier of scientific research.



range of wildlife, was arguably the most important case in the political devel-

opment of the modern environmental movement. While Rachel Carson was a highly sophisticated writer with some scientific training, she was not, as Mazur notes, a research scientist working in a scientific institution. She was writing as a journalist and, as he puts it, a citizen.

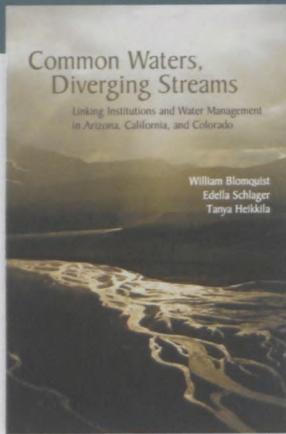
Nor, Mazur adds, was her warning an isolated event. It was seized by an audience that remembered the (false) alarms over cranberries treated with allegedly carcinogenic herbicides and the (true) alarm over the drug thalidomide shortly before *Silent Spring* appeared.

While Mazur offers some general rules for figuring the odds that a new charge is valid, he also conveys the truth that, as any bookie knows, the odds aren't a reliable guide to specific cases. Controversy over health and the environment usually takes place at the outer frontier of scientific research, where even the best informed and most disinterested of observers can be misled.

Policymakers can't avoid acting in haste. But they can keep in mind, if they are wise, that early decisions may be wrong. ■

J.W. Anderson is journalist in residence at RFF.

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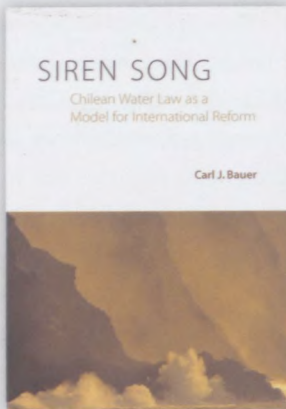
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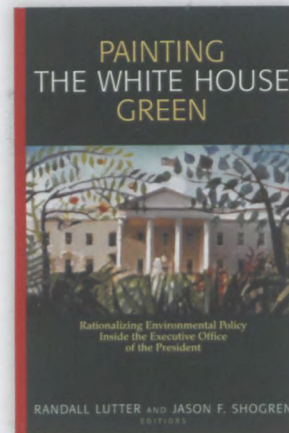
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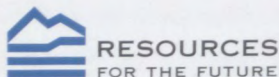
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