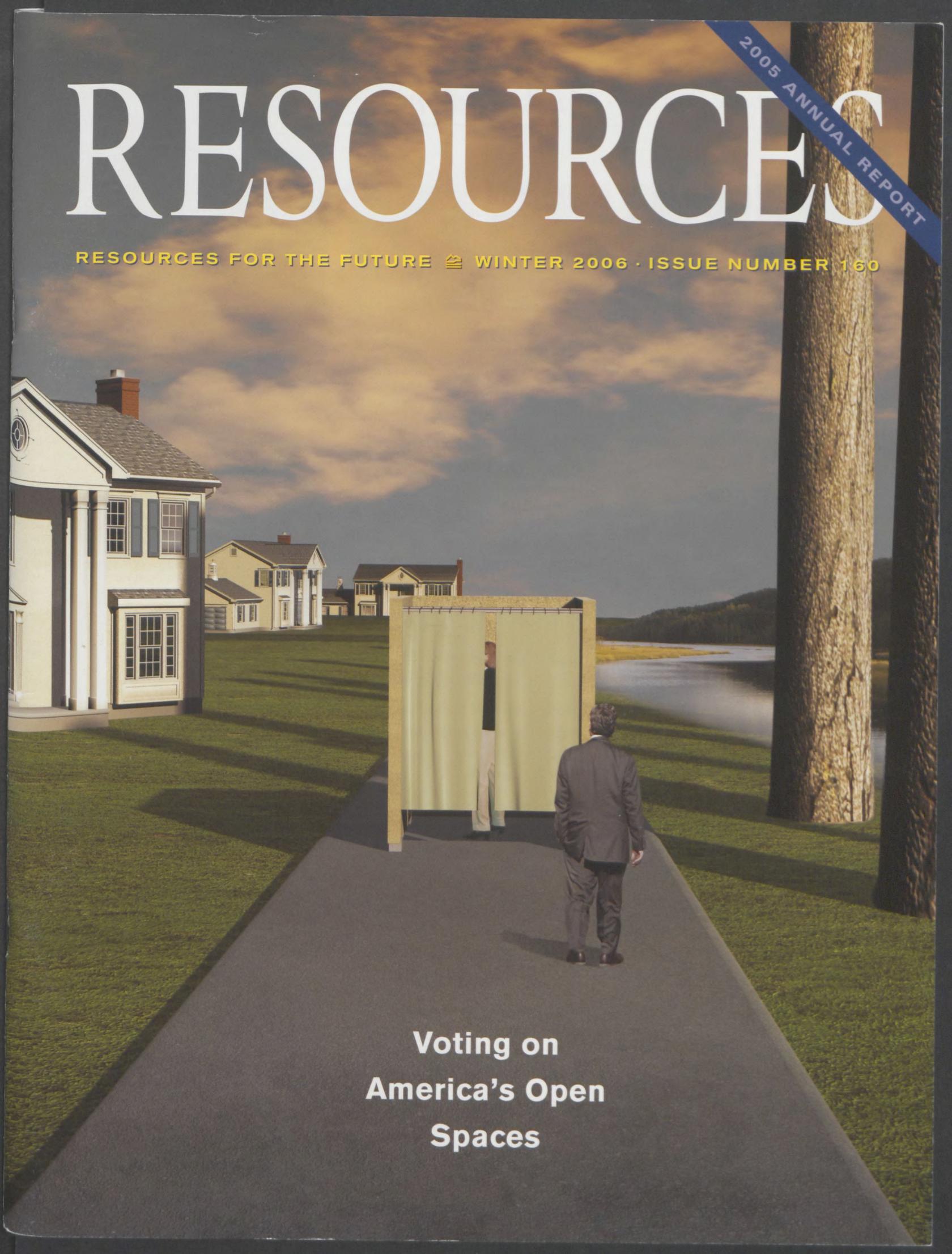


RESOURCES

2005 ANNUAL REPORT

RESOURCES FOR THE FUTURE  WINTER 2006 · ISSUE NUMBER 160

A man in a dark suit is walking away from the viewer on a paved path. In the distance, a voting booth with light green curtains is visible. The setting is a park-like area with a large white house on the left, a body of water on the right, and tall trees. The sky is overcast.

**Voting on
America's Open
Spaces**

Contributors



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CONTENTS



2005
*Annual
Report*



FEATURES

Voting for Conservation: What Is the American Electorate Revealing? 7

Spencer Banzhaf, Wallace Oates, James N. Sanchirico, David Simpson, and Randall Walsh

RFF 2005 Annual Report: Ideas, Independence, Impact 13

Malaria among African Children: Hope for Progress against a Growing Menace 25

Ramanan Laxminarayan

Making Tough Choices: Hurricane Protection Planning after Katrina and Rita 29

G. Edward Dickey and Leonard Shabman

DEPARTMENTS

Goings On

RFF Setting the Stage for Important
Climate Policy Discussions 2

Taking the Measure of U.S.
Energy Policy 4

Heating Subsidies Make a Difference
in Offsetting Winter Mortality Rates
among the Poor and Elderly 5

Inside RFF

RFF Board Elects Dan Esty, Yale Law
School Professor 33

RFF Announces Major Conference
on Frontiers of Environmental
Economics 34

Examining China's Mineral
Consumption 35

Resource Links 35

RFF Setting the Stage for Important Climate Policy Discussions

Resources for the Future provided forums for discussion on business, politics, and climate change at two major events this fall. Sen. Jeff Bingaman (D-NM) delivered key remarks at both events, which were cohosted by CLIPORE, the climate policy research program of Sweden's Foundation for Strategic Environmental Research.

Bingaman provided the luncheon address at a conference the two organizations convened in New York on November 30 to examine European and American business views on emissions trading and climate policy. Speakers at the daylong event included industry and utilities executives, representatives from the oil and gas sectors, economists, and policy-makers. According to most, the United States is moving toward a national policy mix that will inevitably include mandatory programs to control carbon dioxide emissions.

Both businesspeople and economists at the conference agreed that one key issue for a U.S. climate program would be the rules for distributing emissions allowances. Since those allowances would have substantial market value, participants noted, the allocation system would have important implications for the terms of competition among different sources of energy and among different parts of the country. One complicating fac-

tor is that electric power generators in about half of the country are deregulated, while the other half continue to operate under traditional price regulations, allowing them to pass costs forward to their customers.

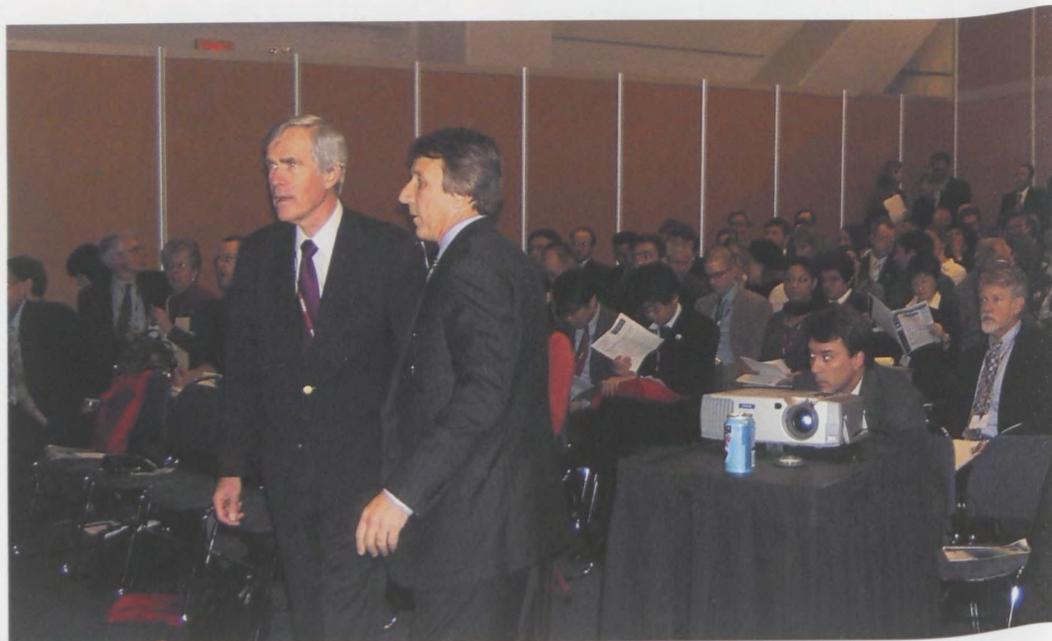
Uncertainty around the timing and the structure of climate policy changes has left the electricity industry in a quandary about how to proceed on reducing greenhouse gas emissions. To move ahead, the executives agreed, business needs clear price signals on carbon dioxide emis-

sions to drive the shift to new technologies. At the same time, price signals alone cannot be the solution—national policy must include a mix of carbon pricing and technology support.

More broadly, several business leaders stressed the need for greater public understanding of climate policy and support for action. They asserted that a disproportionate responsibility for emissions control is being assigned to corporations. "The private sector can't do it on its own," said Kevin Fay, executive director of the International Climate Change Partnership, a business group.

Timothy J. Richards of General Electric ticked off a wide range of technologies that could contribute powerfully to reducing carbon dioxide emissions. But he also listed some of the barriers to using them: some have costs that are, at least initially, higher than those of present equipment. Some industries and governments are

Sen. Jeff Bingaman of New Mexico (left) is greeted by RFF Senior Fellow Ray Kopp before briefing a standing-room audience on U.S. climate policy. The event, sponsored by RFF and CLIPORE, was held at the first UN Conference on Climate Change since the implementation of the Kyoto Protocol. Bingaman's address was the only public appearance by a member of Congress at the Montreal conference.



Weathervane: A Guide to Global Climate Policy

From regional initiatives to national actions to international treaties, climate policy captures the attention of policymakers, business and environmental leaders, and citizens of countries throughout the world. RFF scholars continue to be at the forefront of research on the environmental and economic aspects of climate change and on efforts to develop climate policy.

RFF is pleased to announce Weathervane, a new website highlighting the work of RFF scholars. Signaling developments and directions in climate policy in the United States and around the world, Weathervane provides direct, online access to the most up-to-date findings from RFF's research.



www.weathervane.rff.org

not aware of what is available. Some technologies need modification for use in developing countries. And some technologies face regulatory and policy barriers, such as tariffs on imported equipment.

Technology is actually available, and not really that expensive, so what is needed are a few focused efforts to make it happen, he observed.

"I believe the world is getting warmer," said James E. Rogers, chairman and chief executive of Cinergy Corp., who praised the British government for setting targets for the year 2050. He advocated what he termed "cathedral thinking," likening climate change policies to the plans of architects and builders of great European cathedrals. "They didn't know if the designs or the construction techniques would work—and they knew they wouldn't live to see the final product—but they went ahead for the sake of future generations," Rogers said.

Meanwhile, he noted, many utility executives expect that Americans will be living in a "carbon-constrained" world in the near future. He added, "I

personally believe that mandatory caps is where we'll end up."

A tipping point may have come last June, when the U.S. Senate approved a resolution calling for legislation to impose mandatory, market-based limits on greenhouse gas emissions.

Bingaman told conference attendees that he considered it possible to achieve that legislation within the next two years. But other speakers pointed out that the Bush administration adamantly opposes mandatory controls, and the House of Representatives is likely to be guided by the White House.

RFF at COP-11

Bingaman reiterated his position at a side event hosted by RFF and CLIPORE at the United Nations Conference on Climate Change in Montreal the following week. That event, titled "Engaging the U.S. in Climate Policy: Recent Developments and Prospects for the Future," followed the New York conference, and provided a forum for the only public remarks by any member of the U.S. Congress at the meetings.

To a room overflowing with those eager to hear more about climate change policy developments in the United States, Bingaman discussed the evolution of thinking within the Senate regarding the development of federal greenhouse gas policy and reiterated his belief in a mandatory, economywide policy to limit greenhouse gas emissions.

Until now, the McCain-Lieberman bill has been the leading legislative proposal, but the Senate has defeated it twice. The alternative, Bingaman said, is the concept put forward by the National Commission on Energy Policy (NCEP). He outlined the three important differences between them: the NCEP concept would set less ambitious goals, establish a maximum price for allowances to limit the cost of emissions reduction, and provide for periodic congressional review.

The senator's talk was followed by remarks from Fay; Christopher Walker, managing director, Greenhouse Gas Risk Solutions, SwissRe; and Ambassador Bo Kjellén, leader of the Swedish delegation to the Kyoto Protocol negotiations.

Fay called for governments of all nations to provide more certainty regarding long-term emissions reduction goals and paths for achieving those goals. "For most industries, we are already into the product planning period for 2012," he noted, as the Kyoto Protocol's limits on emissions end in 2012, and what happens thereafter has not yet been negotiated.

Walker offered an insurance company perspective, stating that the sector is likely to be affected by the adverse impacts of climate change before other sectors of the economy. "We do believe the climate is changing," said Walker. "Unusual events are accumulating," including weather patterns, and that, he noted, is creating concern in the insurance industry.

Ambassador Kjellén concluded the session, providing a European response to the senator's remarks and the commentaries given by the industry representatives. Citing the international leadership the United States provided in the early 1990s as discussions of global action were beginning, he expressed the need and hope for renewed engagement by the United States.

While in Montreal, RFF also co-hosted an official United Nations side event, with World Resources Institute and the Northeast States for Coordinated Air Use Management, on the Regional Greenhouse Gas Initiative being put forward by a network of states in the Northeast. That event, titled "The RGGI Model: Allocations, Offsets, and Linkages," was moderated by RFF President Phil Sharp and featured RFF Senior Fellow Dallas Burtraw as a panelist. The two side events illustrated the breadth of RFF's contributions to ongoing discussions on climate policy at all levels. ■

Taking the Measure of U.S. Energy Policy

The Energy Policy Act of 2005, signed into law in August, is the first major piece of energy legislation passed in a decade. Last November, RFF, GLOBE USA, and the Henry M. Jackson Foundation presented a daylong seminar to examine the act and assess how well it addresses the key drivers of contemporary energy policy: national security, climate change, and technology development and deployment.

This seminar was the culmination of the Energy 2050 series of Congressional briefings that explored policy options and strategies to address America's future energy needs.

National Security

Frank Gaffney, president and CEO of the Center for Security Policy, warned about the dangers of dependence on unstable or unfriendly foreign sources of oil. He argued that this situation places the U.S. economy in a perilous position and pumps millions of dollars into unreliable countries daily.

A frequently cited possible insulator from global oil market shocks is the Strategic Petroleum Reserve (SPR). The Energy Policy Act calls for the SPR to be increased from 700 million barrels of oil to one billion barrels but does not address criteria for tapping into the reserve. "Should there be more explicit use criteria? What is the optimal size?" asked

Joseph Aldy, an RFF fellow. He noted that it took nearly two months for oil released from the reserve following Hurricane Katrina to reach the market—indicating that the SPR does not insulate the U.S. economy from the volatile international oil market.

Joel Darmstadter, an RFF senior fellow, argued that "a dramatic switch to oil self-sufficiency wouldn't keep the U.S. from feeling shocks. The key to insulating ourselves is simply using less oil." Unfortunately, initiatives laid out in the new energy bill, he said, offer no quick fixes.

Rob Weiner, Gilbert F. White Postdoctoral Fellow at RFF, concluded the discussion, noting, "Uncertainty and volatility—not high or low prices—determine energy security."

Climate Change

Although the Energy Policy Act did yield a title addressing greenhouse gas (GHG)-reducing technology development and deployment, it took no action on limiting GHG emissions. However, according to Nikki Roy, congressional affairs director at the Pew Center on Global Climate Change, "Whenever you're writing an energy bill, you're also writing a climate change bill, whether you intend to or not. The issues of energy supply, energy security, and climate change are almost inextricably linked."

Panelist Richard Morgenstern, an RFF senior fellow, went on to highlight the impact economics has had on climate policies, making reduction targets more realistic and acting as a driving force in domestic climate policy.

William Pizer, an RFF fellow, pointed out that recent policy discussion—including the Sense of the Senate resolution on climate change—indicates "something like a consensus on a climate change approach is emerging." With the resolution, he ex-

plained, policymakers for the first time called for action that might cause some harm to the U.S. economy.

Technology Development and Deployment

Opening a discussion on the strengths and limitations of technology policy in addressing projected energy demand, Brian Castelli, executive vice president of the Alliance to Save Energy, noted that the Energy Policy Act of 2005 will help spur technical developments by providing tax incentives for fuel-efficient appliances and tax credits for energy-saving building design. However, Castelli said, "It does virtually nothing to promote conservation technologies in cars and trucks or in manufacturing."

Other panelists reviewed factors that have limited innovation in energy technologies in recent years. Linda Cohen, economics professor at the University of California, Irvine, said indirect costs of research, lack of incentives, poor patent policies, and outsourcing of new product development were to blame.

Karen Palmer, Darius Gaskins Senior Fellow at RFF, enumerated prospects for such processes as clean coal technology, coal gasification, and renewable energy sources. "Higher energy prices and greenhouse gas emission standards may spur these technologies into marketable products," she noted.

RFF Visiting Scholar Robert Fri looked at the problems facing a revived U.S. nuclear power industry and pointed to provisions in the new energy act designed to encourage building of the first new nuclear power plant in the United States since the 1970s. However, even a restored nuclear power industry won't dramatically change the U.S. energy picture for the better, he predicted. ■

Heating Subsidies Make a Difference in Offsetting Winter Mortality Rates among the Poor and Elderly

by Joseph E. Aldy

Some households could pay up to 38 percent more to heat their homes this winter than last year, according to the U.S. Department of Energy (DOE). This energy price shock, coupled with the possibility of occasional cold-weather spells during the winter, can adversely affect the health of households, especially those living on tight budgets and the elderly. People will pay more to heat their homes and spend less on food and prescription drugs, and some who can't pay their energy bills will have their heat turned off.

Higher mortality rates, especially for cardiovascular and respiratory causes of death, are associated with colder winter temperatures, according to extensive epidemiological literature. In recent research, I have extended the standard epidemiological framework to assess the effects of energy prices and energy subsidies on low-income households, in addition to the effect of temperature on winter mortality risk. To complement this work, I have also estimated the effects of higher wintertime energy bills on elderly individuals' prescription drug expenditures.



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Between 1983 and 2000, December, January, and February had the highest average national mortality rates, with even rates higher in colder-than-average years. Consistent with prior epidemiological research, I found that winter temperatures, and colder-than-average winter temperatures, were associated with higher mortality rates. But even after accounting for these temperature effects, higher energy prices were also found to be associated with higher wintertime mortality.

Cold weather can severely stress the health of the old and frail, and this can be exacerbated by high energy prices, which are effectively the cost to a household of mitigating its exposure to cold temperatures. If gas or heating oil prices are low, then even low-income households can respond to a winter cold spell by turning up their radiators or maintaining a comfortable temperature on their thermostats. High energy prices, however, appear to force low-income households to consider substantial trade-offs that may impair their health.

So given this basic premise, that the poor and the old suffer more when temperatures fall, how well have government policies worked to insulate them from weather and energy price shocks? To address this question, I looked at the Low Income Home Energy Assistance Program (LIHEAP), which has provided subsidies to U.S. households for home heating during cold winter months (and in some states, for cooling in hot summer months) since the 1980s. The program, funded primarily by block grants from the federal government to all 50 states, provides a check, voucher, or direct utility payment once during the heating season for households below a percentage of

the poverty line, which varies among states and over time.

In my analysis of LIHEAP, I focus on the mortality risk reduction benefits for the low-income elderly. I find that states with more generous LIHEAP programs that cover a greater share of their 60-and-over population have lower mortality rates during the months of December, January, and February, after accounting for the effects of temperature, energy

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prices, and socio-economic characteristics. These energy subsidies generate greater mortality risk reduction benefits in states experiencing colder-than-average months relative to those with typical winter temperatures. The mortality reduction benefits are also much greater for "cold" winter states, such as North Dakota, than for "warm" winter states, like Florida. The program also provides some assistance for cooling in the summer, but this does not have a significant impact on summertime mortality rates. Through a variety of analyses, I esti-

mate that the LIHEAP program reduces winter premature deaths by 2,400 to 3,800 among the 60-and-over population annually.

Energy subsidies may reduce wintertime mortality for two reasons. First, such subsidies help low-income households keep their heat on. DOE surveys show that utilities turn off the heat for some 1.5 million households at some point during a typical winter. Extremely cold indoor temperatures can cause hypothermia and further stress weakened cardiovascular and respiratory conditions. Second, energy subsidies can mitigate the stark trade-offs some low-income households face regarding consumption of basic goods.

Prior research has shown that some low-income households reduce their food intake in response to cold winter temperatures. To complement this prior "heat or eat" research, I focused on the trade-off between wintertime heating bills and prescription drug expenditures. Every dollar a household living below the poverty line with a 60-and-over member pays for higher energy bills reduces its prescription drug expenditures by some 40 cents. In contrast, there is no significant impact of higher energy bills on the prescription drug expenditures of households living above the poverty line.

These findings indicate that heating subsidies to the low-income elderly can partially offset the mortality effects of cold weather and energy price shocks by mitigating the tough choices low-income households face among heating, eating, and buying prescription drugs. Future research will further explore the design and implementation of the LIHEAP program to determine how best to target the program to maximize its benefits. ■



VOTING FOR CONSERVATION

WHAT IS THE AMERICAN
ELECTORATE REVEALING?

SPENCER BANZHAF, WALLACE OATES, JAMES N. SANCHIRICO, DAVID SIMPSON, AND RANDALL WALSH

You know, if one person, just one person [walks in and sings 'Alice's Restaurant'] they may think he's really sick and they won't take him. . . . And if three people do it, three, can you imagine, . . . [t]hey may think it's an organization. And can you, can you imagine fifty people a day, I said fifty people a day walking in singing a bar of 'Alice's Restaurant' and walking out? And friends, they may think it's a movement.

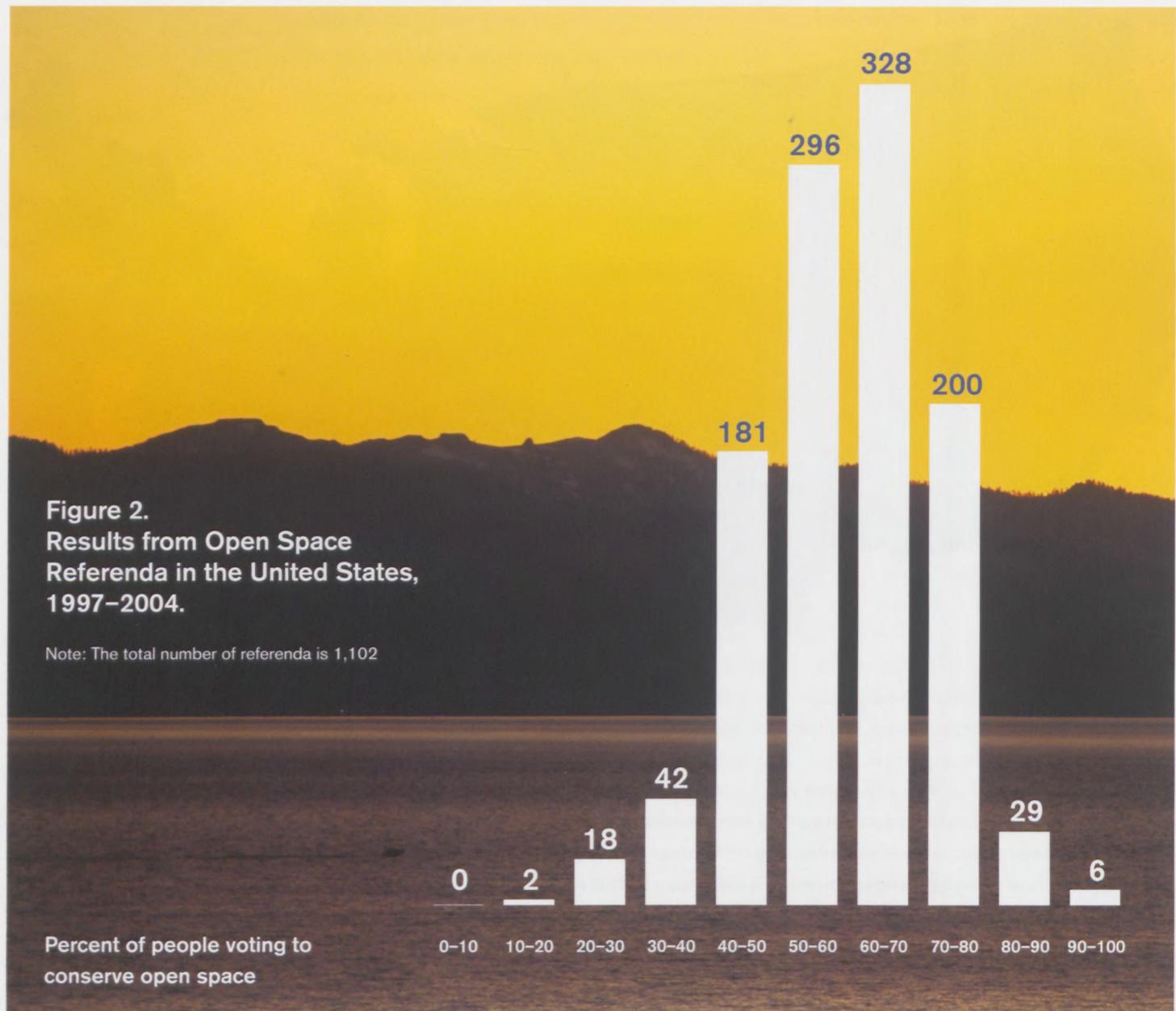
—Arlo Guthrie

FROM 1997 TO 2004, more than 1,100 referenda for the conservation of open space appeared on state, county, and municipal ballots across the United States. By the standards of Arlo Guthrie's "Alice's Restaurant," we are witnessing a movement. The movement is widespread and encompasses every level of government and over 40 states, albeit with a concentration in the Northeast (see Figure 1). These referenda address a variety of conservation objectives, including the preservation of agricultural lands; the preservation of ecologically valuable wetlands, meadows, and woodlands; and the creation of new recreational areas. Moreover, the sources of these referenda are quite diverse: some stem from popular support at grass-roots levels and others are top-down initiatives introduced by elected officials.

Upon first glance, the support these measures receive in the ballot box is striking. Over 75 percent of the referenda pass, and most do so by a wide margin. Although most only require a simple majority for passage, the median measure receives approximately 60 percent of the vote. Figure 2 illustrates the outcomes for the referenda between 1998 and 2004, according to the "Land Vote" data set assembled by the Land Trust Alliance and the Trust for Public Lands. Each bar indicates the fraction of referenda for which the favorable vote fell within the indicated 10-percent band. There are, of course, some instances where referenda do not pass. In 2001, for instance, only 18 percent of voters in Godfrey Village, Illinois, voted in favor of spending \$3.7 million on local land preservation, the lowest support in the sample. But these are the exceptions that prove the rule: when conservation measures are on the ballot, voters tend to support spending money on conserving open space.

What does this support reveal about the electorate's preferences for open space? Can we extrapolate the results from the jurisdictions with referenda to other communities that have not had them? For example, can we take the fact that taxpayers in one New Jersey County reveal a willingness to pay \$1 in extra annual property tax to set aside 100 hectares of parkland in their community as evidence that taxpayers in *all* New Jersey counties would endorse a similar tradeoff? Can our experiences to date with different types of referenda and payment mechanisms guide the development of future referenda, in form or in substance? These are some of the questions that we are addressing in ongoing research combining the Land Vote data with information on the makeup of the electorate, the geographical and economic features of the jurisdictions, and specifics concerning the measures themselves.

Using the data on open space referenda to address these questions is a complex undertaking for a number of reasons. In many kinds of statistical analyses, we can safely assume that we are working with a random sample of observations. Such randomness allows us to employ powerful statistical tests. But with these conservation referenda, we are dealing with anything but randomness. They are the result of careful planning. Environmental organizations are likely to target the most promising jurisdictions for the referenda. Some, like the Conservation Fund and the Trust for Public Land, have published books (or manuals) that provide detailed guidance on "the how and where" of designing and introducing conservation referenda. Accordingly, the jurisdictions that hold them are not likely to be a random sample of all jurisdictions.



the precinct level (there are approximately 20–200 precincts per county) to allow us to evaluate how different demographic groups vote on the same open space referenda. We are also collecting voting data on other referenda, such as school financing measures that were on the ballot concurrent with the open space measures that we are studying. Analyses of differences across demographic groups in their relative support for different ballot measures will provide additional insights into the motivations driving support for open space protection. For example, to the extent that ecological or recreational motives lie behind the support for the conservation of open spaces, renters would be expected to be just as supportive as homeowners. To the extent the motive is a restriction in land supply to drive up property values, homeowners are more likely to be the driving force. In addition to addressing such questions with local demographic data, this finer scale analysis will permit us to delve deeper through interviews and local sources into the way that conservation referenda have been initiated, designed, and publicized.

At both scales of analysis, two sets of variables are clearly important in explaining which types of communities are more likely to have referenda. One is the demographic makeup of the residents themselves. As the Trust for Public Land points out in its *Conservation Finance Handbook* (2004), "The first step is to find out precisely who lives and votes in your community." These demographic characteristics of the residents, including their ages, incomes, education, and, as just mentioned, homeownership, can have much to do with their predisposition toward conservation issues. The other is the particular circumstance of a jurisdiction that can reveal the kinds of pressures for conservation that are likely to be present. Such things as the extent of farmland and its rate of loss to new development, the presence of ecologically sensitive landscapes, and rates of economic growth and their form can indicate the extent of concerns with local conservation.

Once these measures are on the ballot, there is the related question of how they fare. In addition to controlling for community characteristics, we need information on the nature of the conservation measure and on its specific form (including such matters as the method of finance). An obvious issue is the cost to the community of any conservation proposals, and this depends in large part on local land prices. The role of land prices is, however, not straightforward. Where land is more expensive, preserving a given amount of open space will obviously be more costly, potentially reducing support for conservation measures. But land prices are generally higher precisely in those areas where open space is being lost to urban sprawl or, in other words, where conservation is most needed. These dual effects must be carefully considered when trying to understand the role of land prices.

Along with the level of funding, a key decision in the design of a conservation measure is the proposed method of finance. Some states prescribe the precise way in which such programs are to be funded, while others allow more discretion. Local property taxes or bond issues have funded most of these measures, but in some instances, local governments have turned to increments to local sales taxes or even income taxes. Some states have provided support as well, frequently in the form of matching grants that supplement funds raised locally.

The choice between local property taxes and the issuance of bonds raises an intriguing issue. The theory of local public finance says that it really should not matter whether a community chooses to finance a conservation program (or any local public project) through bonds or property taxes. That is, there is a kind of "fiscal equivalence." In the case of property taxes, for example, the community pays for the program with an increase in current property tax levies. With bond finance, the community borrows the needed funds but takes on the obligation to repay these funds at a future time. The future tax liability associated with the bond issue, however, is now attached to local property, and the current market value of local residences and businesses should be reduced accordingly. In the end, the residents pay for the program one way or the other. Of course, they also reap the benefits from the preservation of the open space, which will, in their own right, enhance local property values.

The general point is simply that the benefits and the costs of local programs (including future benefits and costs) tend to manifest themselves in current local property values. And there is a lot of evidence to support this proposition. For example, it is commonly observed that residences in excellent school districts sell

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at a premium or that homes in unsafe areas command lower prices; likewise, jurisdictions with relatively high tax rates have, other things equal, commensurately lower property values. It is thus unclear whether it should make any difference in the appeal of conservation referenda whether they are financed by local property taxation or bond issues.

Preliminary analysis has turned up an interesting finding on this matter. The passage rate on conservation referenda funded by local property taxation (54.5 percent) is significantly higher, on average, than those funded by bond issues (30.6 percent). This would seem to imply that voters support referenda that rely on local property taxes over those financed by bonds. However, on more careful consideration (making use of multiple-regression analysis), we find that jurisdictions that use property-tax finance in their referenda have other characteristics that make passage more likely. And when we control statistically for these other factors (such as demographic makeup, geography, and the level of the jurisdiction), it turns out that property taxation is more of an impediment to passage than is bond finance. Perhaps local electorates find it appealing to spread out payments over time through the use of bonds rather than paying the whole bill upfront in current property taxes.

WILLINGNESS TO PAY TO PRESERVE OPEN SPACE

These referenda data can tell us how much the American populace is willing to pay for open space protection—a crucial ingredient in benefit-cost analysis. Typically, such information is obtained through surveys eliciting people's values. But such surveys employed in these techniques are often faulted for failing to ask people "real" questions. There is a difference between asking people what they would be willing to pay for something and actually making them live with higher taxes. Actual referenda obviate this problem: taxpayers voting in elections really are putting their money where their mouth is.

While one might not think of a referendum as a decision to "purchase" something, it is: voters decide whether to tax themselves to pay for the preservation of local open space. (Admittedly, this presumes a fairly high level of sophistication among certain voters; renters, for example, must realize that higher property taxes will eventually be factored into their rent). By looking at the way the share of people voting to support conservation falls when the "price" (in current or future taxes) increases, we can infer this trade-off. Evidence of people's willingness to pay for such "purchases" would be useful for a number of different purposes. In designing proposals for the ballot, for example, the *Conservation Finance Handbook* stresses that one of the key issues is determining how much voters are willing to spend.

More generally, public decisionmakers must determine whether the benefits of preserving nature justify the costs. Federal agencies in the United States are required by Executive Order to quantify the benefits of the rules they propose, where possible, and local decisionmakers often try to take such information into account. Quantifying benefits is particularly difficult when they arise from the preservation of biological diversity and natural ecosystems, for which no established markets and prices exist.

Thus, these referenda on the conservation of natural lands and open spaces, though themselves local, have the potential to unlock information that would be useful to state and federal policymaking. Of course, a study of their progress also can help inform and guide the activities of land trusts and other stakeholders, as they consolidate and extend the conservation "movement." ■

The authors wish to acknowledge the support provided by the Lincoln Institute of Land Policy and the University of Colorado at Boulder for this project.

RESOURCES FOR THE FUTURE

Annual Report

2005

Ideas

Independence

Impact

A MESSAGE FROM

IDEAS, INDEPENDENCE, IMPACT

At any point in a typical year, scholars at Resources for the Future are engaged in more than 100 research projects, and the impact of that work manifests itself in diverse and often unexpected ways. Our research influences the policy process in sometimes unglamorous and highly technical ways, seen only by a few key policy officials or regulators, as well as in outcomes that can be highly visible and far-reaching.

Even during my relatively short stint at RFF, I have seen our work inform and influence the direction of public policies in Washington and around the globe—always characterized by an independent and objective perspective. One example: when the Office of Management and Budget began efforts to develop new procedures for performing regulatory impact analyses on all federal regulations, OMB officials came to RFF to think through the relevant issues and bring together government analysts, academics, and stakeholders to work through them.

In the arena of climate change, RFF researchers were among those who pioneered the idea of a “safety valve” to help alleviate undue economic stress on industries—as well as costs to consumers—seeking to comply with rigorous emissions standards. And in the expanding area of ecosystem management, our scholars are at the forefront of finding pragmatic indicators that can accurately gauge changes in ecosystem services. You may not read much about these quiet endeavors in the popular press, but you can be certain they will be useful to generations of policymakers.

A separate strategy for placing policy issues in higher relief is the public discourse that RFF encourages through its convening power in Washington and other major cities. Our Policy Leadership Forums, First Wednesday Seminars, and technical workshops and topical seminars provide opportunities for engagement and debate that can lead to more enlightened policymaking. Late in 2005, for example, RFF arranged a well-timed workshop on a proposed change in the Corporate Average Fuel Economy standards to help both regulators and the regulated consider new approaches. The result? The Department of Transportation took account of many of the suggestions that emerged from that small gathering into its eventual policy.

A highlight of our public exchanges over the past year was the Energy 2050 project, a series of six Capitol Hill briefings—attracting some 500 congressional members, staff, and guests—on the long-term energy outlook, which were held as Congress was debating the eventual 2005 Energy Policy Act. Major conferences and events on emissions trading regimes related to climate policy were held in New York and Montreal in partnership with CLIPORE.

RFF research also is characterized by the breadth of our agenda—as a glance through our annual output of publications and Internet features quickly demonstrates. In addition to continuing work on climate change, energy, and electricity, seminal work is under way in a number of biological resource areas, including land and water use, oceans and fisheries, malaria abatement and antibiotic resistance, and international environmental and development issues. At the state level, RFF is providing independent analysis of a groundbreaking effort by several northeastern states to create a regional response

THE PRESIDENT

toward climate change. Known as the Regional Greenhouse Gas Initiative, this collaborative effort may become a model for other multi-state consortiums or a national policy.

RFF is at the center of these new policy prescriptions and many others. We nurture the intellectual entrepreneurship that produces new, rigorous, and *pragmatic* approaches to problems that will enable those in government and the private sector to better chart their courses with confidence and clarity.

To be sure, the policy process can be frustratingly prolonged and easily sidetracked—and often dependent on the interplay of timing, personalities, and external events. Over time, however, it is clear that the quiet yet purposeful work by RFF researchers has paid off in beneficial policy impacts and positive results for the environment, the economy, and the public welfare.

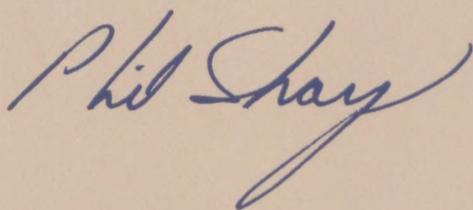
The year 2005 was one of transition for RFF, as the institution saw the departure of Paul Portney as president and the installation of Frank Loy as our Board chair. I want to express my deep thanks and appreciation to these individuals—as well as to outgoing Chair Bob Grady—for the legacy and vision they inspired during their leadership.

Over the past year, RFF appointed distinguished scholars to our first two academic chairs, endowed by former Board member Darius Gaskins and long-time supporter Chauncey Starr. In addition, we relaunched a better version of our vaunted Weathervane website on climate policy, and began an upgrade of our web and computer infrastructure.

Such times of transition offer the opportunity to take a fresh look at our mission and to make any necessary course adjustments. To that end, we look forward to completing a thorough strategic review of our operations in the coming year—a process that I am co-chairing with RFF Vice Chair Larry Linden. As always, our friends and supporters are invited to weigh in on this process. I invite you to let me know your ideas on our future endeavors by sending an email to emergingissues@rff.org. I can assure you that your comments will be given respectful and sincere consideration.

In the pages that follow, you will find the names of individuals and institutions who have supported our work through financial and other assistance in the past year. On behalf of all of us at RFF, I want to convey my gratitude for that demonstration of confidence.

Too many years ago, I had a college professor who was never completely satisfied with his students' work, whatever its merit. On the best papers, he often would write, "This is too good not to be better." Such a high standard can be difficult to meet, but it is a worthy goal for an already outstanding institution like RFF, which has only greater accomplishments and impacts to bring to bear on future policies.

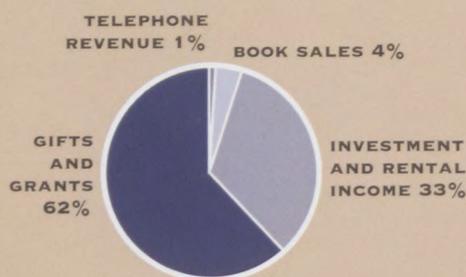


Phil Sharp
President

FINANCIAL STATEMENT

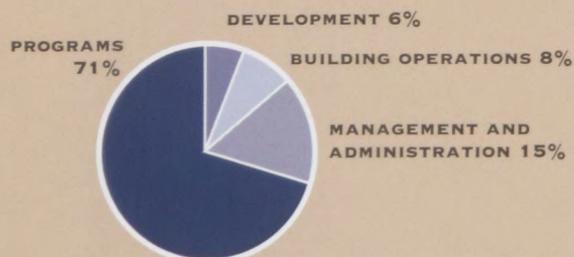
REVENUE

In fiscal year 2005, RFF's operating revenue was \$9.4 million, 62% of which came from individual contributions, foundation grants, unrestricted corporate contributions, and government grants. RFF augments its income by an annual withdrawal from its reserve fund to support operations. At the end of fiscal year 2005, the reserve fund was valued at \$35.2 million.



EXPENSES

RFF research and educational programs continued to be vital in 2005, representing 71% of total expenses. Management and administration, and development expenses combined were only 21% of the total. The balance is made up of building operations related to facilities rented to other non-profit organizations.



ASSETS	Year Ended September 30	2005	2004
Cash and cash equivalents		\$ 331,077	\$ 339,937
Grants and contracts revenue receivable		513,023	990,348
Contributions receivable		537,050	422,643
Receivable from RCC		156,434	-
Other receivables		570,051	457,195
Prepaid expenses		3,032	29,693
Other assets		504,038	1,022,256
Total current assets		\$ 2,614,705	\$ 3,262,072
Contributions receivable, net of current portion		\$ 26,090	\$ 571,916
Investments at fair value		35,244,118	19,005,725
Investment in land		8,900,000	-
Investment in RCC		4,623,638	-
Total investments		\$ 48,767,756	\$ 19,005,725
Fixed assets—operating—net of accumulated depreciation		7,234,327	7,560,753
Fixed assets—RCC—net of accumulated depreciation		-	13,324,639
Fixed assets		\$ 7,234,327	\$ 20,885,392
Assets held under charitable trust agreements		\$ 441,106	402,657
TOTAL ASSETS		\$ 59,083,984	\$ 44,127,762

LIABILITIES AND NET ASSETS	Year Ended September 30	2005	2004
Grants and awards payable		\$ 23,327	\$ 18,000
Accounts payable and accrued liabilities		1,644,775	2,475,737
Deferred option to purchase partnership interest		-	500,000
Deferred revenue		540,020	184,649
Line of credit		-	2,839,809
Tax exempt bond financing, current portion		180,000	170,000
Total current liabilities		\$ 2,388,122	\$ 6,188,195
Tax exempt bond financing, net of current portion		6,984,914	7,169,914
Liabilities under trust agreements		568,075	560,868
Funds held for others		94,150	143,056
TOTAL LIABILITIES		10,035,261	14,062,033
TOTAL UNRESTRICTED NET ASSETS		49,048,723	30,065,729
TOTAL LIABILITIES AND NET ASSETS		\$ 59,083,984	\$ 44,127,762

STATEMENT OF ACTIVITIES <i>Year Ended September 30</i>	2005	2004
CHANGES IN UNRESTRICTED NET ASSETS		
REVENUE		
Individual contributions	\$ 327,795	\$ 2,124,172
Foundation grants	1,548,267	754,627
Corporate contributions	1,029,000	1,088,250
Government grants and contracts	2,124,480	2,092,495
Other institution grants	859,717	698,124
Rental income	1,888,798	1,067,332
Investment income net of fees	1,215,584	472,384
Telephone revenue	100,374	93,670
Book sales	343,048	270,121
Total operating revenue	\$ 9,437,063	\$ 8,661,175
Real estate investment income net of expenses	-	\$ 549,692
TOTAL REVENUE	\$ 9,437,063	\$ 9,210,867
EXPENSES		
<i>Programs</i>		
Energy and Natural Resources	\$ 2,163,067	\$ 2,496,729
Risk, Resource, & Environmental Management	1,082,183	1,095,975
Quality of the Environment	2,903,754	2,561,130
Academic Relations	239,063	310,288
RFF Press	603,101	598,289
Communications	874,581	846,467
Other direct	(146,545)	156,603
Total program expenses	\$ 7,719,204	\$ 8,065,481
Building operations and maintenance	912,064	1,394,126
Development	609,282	552,480
Management and administration	1,701,762	1,308,215
Total functional expenses	\$ 10,942,312	\$ 11,320,302
Change in unrestricted net assets from operations	(1,505,249)	(2,109,435)
<i>Non-operating revenues (expenses)</i>		
Realized gain on investment transactions	1,450,067	1,220,282
Unrealized gain on investment transactions	1,398,310	576,771
Realized gain from sale of RCC interest	17,639,866	-
Uncollectible pledge	-	(1,150,751)
Line of credit interest expense	-	(72,389)
Income tax expense	-	(71,673)
INCREASE (DECREASE) IN UNRESTRICTED NET ASSETS	18,982,994	(1,607,195)
NET ASSETS AT BEGINNING OF YEAR	30,065,729	31,672,924
NET ASSETS AT END OF YEAR	\$49,048,723	\$30,065,729

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THE RFF INDEX

2,500

subscribers learned about RFF events, research, and publications through RFF Connection, a periodic electronic newsletter launched in May

A SAMPLING
OF ACTIVITIES
IN 2005

5

the number of Congressional committees that RFF scholars testified before on topics ranging from climate change to space commerce in the 21st century

23

the number of EPA, National Academy of Sciences, and National Research Council committees, boards, and review panels RFF scholars served on in 2005

90

articles by RFF scholars were accepted by or published in peer-reviewed academic journals

14,500

people received Resources, RFF's quarterly magazine

10

books were published by RFF Press, including the second edition of The RFF Reader in Environmental and Resource Policy

28

countries, from Japan to Iceland to Argentina, were visited by RFF scholars in 2005

3

public education initiatives were led on climate change, energy, and emissions trading: the six-part Energy 2050 series and two conferences co-sponsored by CLIPORE in New York and at the UN climate change meetings in Montreal

Resources for the Future is an enormously positive intellectual force in the international arena for moving good ideas from theory to practice. There are people, I venture to say, in every single corner of our planet working on mobilizing markets and integrating environmental values into mainstream economic thinking and decisions, and they're all drawing on the incredible endowment that Resources for the Future has created.

—Frank Convery, Heritage Trust Professor of Environmental Policy, University College, Dublin
November 30, 2005



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Malaria among African Children



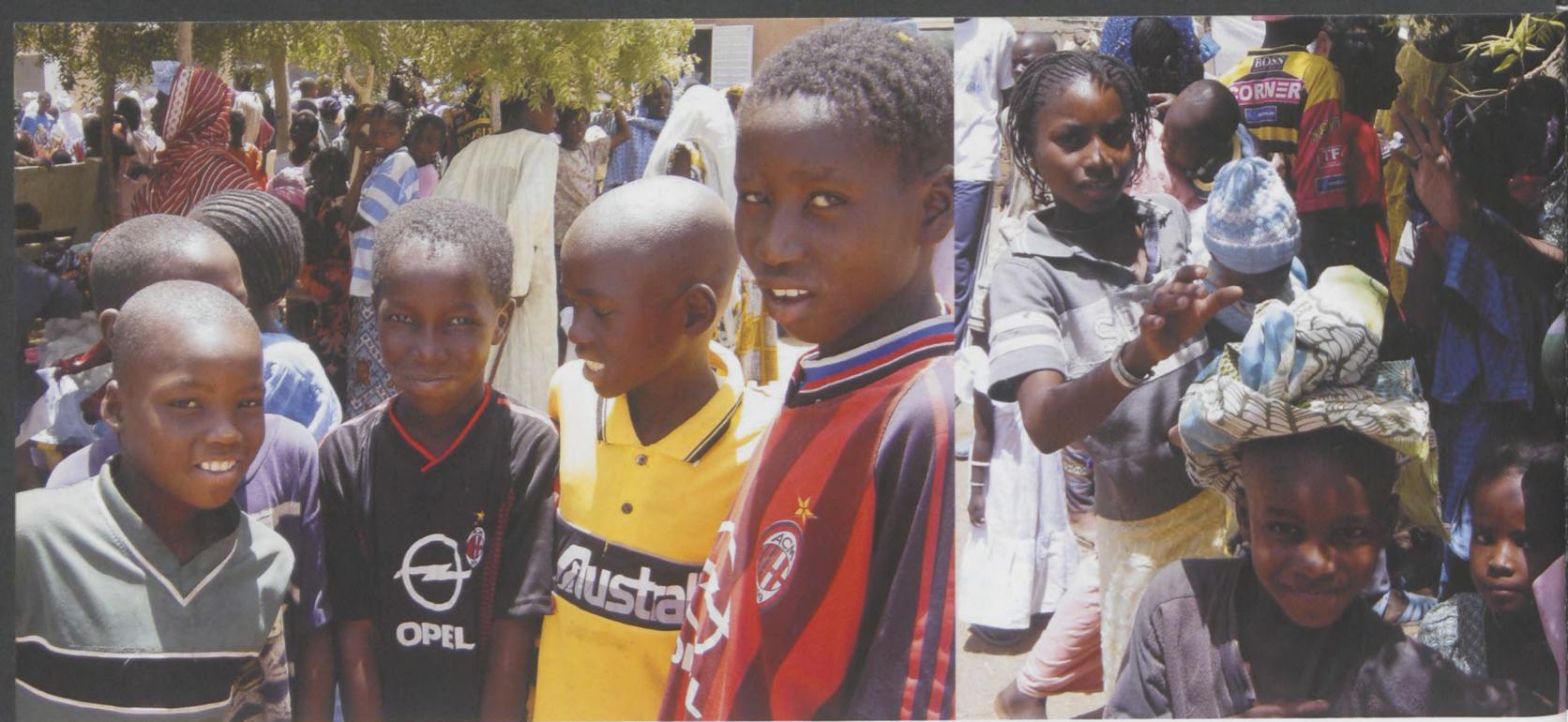
**HOPE FOR PROGRESS AGAINST
A GROWING MENACE**

Ramanan Laxminarayan

Malaria is a silent killer that takes the lives of an estimated one million children under the age of five in sub-Saharan Africa each year. This disease, caused by a mosquito-borne parasite, kills as many as three million persons annually, according to the World Health Organization (WHO), with between 300 million and 500 million new malaria cases occurring every year. Some recent estimates suggest the worldwide total may be closer to 660 million cases annually, and again most of the deaths are in young children.

The rising toll among African children from malaria—as well as HIV/AIDS—runs counter to significant gains in children's health due to fewer deaths from diarrhea, measles, and other vaccine-preventable illnesses. An important reason for this rising death toll is that chloroquine and sulfadoxine-pyrimethamine (fansidar), the two drugs most commonly used to treat malaria in sub-Saharan Africa, are facing high levels of parasite resistance.

There are encouraging signs, however, that public health strategies based on new artemisinin drugs derived from Chinese herbal medicine could work to dramatically mitigate rising deaths from malaria in Africa, particularly among children. Recent research at RFF confirms recommendations from WHO and the U.S. Institute of Medicine (IOM) for new drug therapies that hold promise for malaria-endemic regions. The findings bolster the



argument that an annual international subsidy of roughly \$300 million for antimalarials could ameliorate the threat of malaria and potentially save millions of lives.

The hope is that combined drug therapies can be implemented more widely in affected areas. Like the AIDS “cocktail” that has transformed that illness from an automatic death sentence to something that can be aggressively managed, at least in industrialized countries, the new malaria combination therapies are believed to be more effective at delaying the emergence of resistance when compared to single drugs used as stand-alone treatments, which are rapidly losing their effectiveness.

Malaria doesn’t just kill its victims. It also places a colossal burden on the health and economic well-being of people who live in malaria-prone regions, regardless of whether they have the disease. Malaria causes the members of a household not to “specialize,” because they have to be able to substitute for other family members who may be suffering from malaria; for example, a father who might otherwise earn a cash wage must take care of a sick mother or children. Also, households in malarious regions are less likely to grow high-yield crops that require labor inputs at critical periods during the growing or harvesting season, than households living in areas with low malaria risk.

Macroeconomic studies have shown that malaria could shave as much as 1.3 percent off annual economic growth rates even after controlling for other factors that affect growth. The effect of malaria on household well-being has also been examined. In one project, RFF researchers gauged the impact of reducing malaria on household economic prosperity

in Vietnam. Our analysis showed that reductions in malaria incidence through government-financed malaria control programs contributed to higher household income for all households living in endemic areas. Based on our estimates, the roughly 60-percent average reduction in malaria nationwide in Vietnam during the 1990s translated to a 1.8 percent increase in annual household consumption.

First-Line Treatments Failing

In spite of the strong evidence that reducing malaria can improve economic wealth, there is little to show in terms of progress on the ground. In fact, across much of sub-Saharan Africa, the disease is gaining momentum. Again, the increasing ineffectiveness of first-line antimalarials is believed to be an important contributing factor.

Since its introduction in the 1950s for malaria treatment, chloroquine has been the mainstay of malaria treatment throughout the world. Costing only a few pennies a dose, chloroquine was used widely, even for treatment of febrile illnesses that were unrelated to malaria. It was also mixed with common salt in some countries to provide a prophylactic impact. Despite widespread usage of the drug, mutations conferring resistance to chloroquine are believed to have arisen independently only a few times during its long history of use.

However, these mutations spread widely and with the “selection pressure” imposed by widespread chloroquine use,

The effectiveness of antimalarial drugs is a global public good, of particular value in malaria-prone regions that also are among the most economically impoverished parts of the world.



the drug became largely ineffective against the malaria parasite *Plasmodium falciparum*, except in pockets of South Asia and West Africa. In the face of resistance to chloroquine, many countries have turned to the drug sulfadoxine-pyrimethamine (SP), but parasite resistance to this drug has evolved rapidly, possibly because of its prolonged half-life, resulting in a higher probability of selecting resistant strains. The mutations that conferred resistance to SP were first reported in 1980s in Southeast Asia and are now prevalent in many regions of the world.

In recent years, with the availability of artemisinin derivatives, there has been new reason for hope. Artemisinin drugs, which have been known to Chinese medicine for many centuries, are derived from *Artemisia annua* (a common weed known as sweet wormwood) and are highly effective in treating *P. falciparum*, the most prevalent and deadly parasite in sub-Saharan Africa. Moreover, resistance to artemisinin has yet to be detected in clinical settings.

Recognizing the potential for resistance to curtail the useful life of this valuable drug, WHO has issued guidelines for artemisinin-based combination therapies (ACTs) that incorporate an antimalarial drug unrelated in mechanism of action and genetic bases of resistance to artemisinin, so that a single mutation cannot encode resistance to both components. However, these guidelines are difficult to enforce and are not always followed.

One reason for this is that artemisinin monotherapy is available for sale in many countries (and was even official treatment policy in Vietnam during the 1990s) and has the potential to negate the effectiveness of ACTs globally. Rec-

ognizing that artemisinin monotherapy could be discouraged only by a combination of official policy and economic incentives, an IOM panel composed of economists and public health professionals recently issued a report calling for a high-level, globally administered subsidy for ACTs. Panelists recommended that ACTs be made available to any public or private agency at a price that was comparable to that of anti-malarial monotherapy at roughly 10 cents a treatment course—a global treatment plan that would cost between \$300 million and \$500 million each year. With the potential for malaria to decrease with ACT use, at least in low transmission settings, the cost of the subsidy could only decline over time.

The head of the WHO malaria program has gone a dramatic step further, recently calling on 18 pharmaceutical companies that produce artemisinin to stop selling the drug in its singular form or face public condemnation and possible efforts on the part of WHO to disrupt their sale.

Balancing Short- and Long-Term Costs

Some of the background research that informed the IOM committee's deliberations was conducted at RFF. This work analyzed different strategies that could be adopted to treat malaria where resistance was a concern. Countries could introduce the cheaper drug SP as a replacement for chloroquine and then move to ACTs when resistance emerged to compromise SP potency. The advantage of this strategy would be the significantly lower price and ease of dosing for SP (a

one-day treatment). An alternative strategy would be move directly to ACTs.

Switching first to SP was preferable when the proportion of patients who would get malaria treatment was either very low or very high. At very low levels of treatment coverage and low selection pressure, resistance to the less-expensive SP is not a problem and therefore is the preferred option. At extremely high levels of treatment coverage, however, resistance evolved so rapidly, regardless of whether SP or ACTs were used, that the difference between the two drugs was not as great. It was for intermediate (and the most plausible) levels of treatment coverage that introducing ACTs was always superior even though it was the more expensive drug.

Our research also showed that for shorter time horizons, it made sense to use SP first to delay the costs of ACTs. If one were only interested in the short term, using the less expensive drug makes better economic sense because the costs of resistance-related morbidity do not enter the policymaker's set of considerations. However, for longer planning horizons, a direct switch to ACTs made better economic sense given the costs of higher morbidity associated with increasing resistance to SP.

Overall, we found that introducing ACTs immediately was likely to be preferable, under most circumstances, to an alternative strategy of first using SP in countries where SP had yet to be introduced and then moving to ACTs. There were two reasons for this. First, introducing SP, a drug to which resistance was likely to emerge in the next few years, would result in deaths and morbidity that could be averted by moving to ACTs right away. Second, the continued use of artemisinin monotherapy and partner drugs alongside SP would greatly speed up resistance to ACTs when they were introduced.

More recent work at RFF, in collaboration with colleagues at the National Institutes of Health and the World Bank, has focused on the important question of whether a large subsidy for ACTs would increase their use so much as to excessively speed up the rate at which resistance emerges to the combination. Since the benefits of the subsidy in terms of driving out artemisinin and other potential partner drug monotherapy could be offset by the negative consequences of expedited resistance to ACTs, would subsidies help at all?

Using economic and epidemiological mathematical models of malaria transmission and drug resistance, we find that the answer turns out to be yes for a wide range of possible economic and epidemiological parameters. Subsidies are likely to prolong the life of artemisinin and partner drugs even if overall ACT were to go up significantly in response to the subsidy. However, this would happen only if subsidies were introduced without delay. A delay would permit contin-

ued use of monotherapy of both artemisinin and of likely partner drugs to artemisinin and emergence of low-level resistance. Resistance would then be magnified through intense selection pressure with the introduction of a full subsidy program.

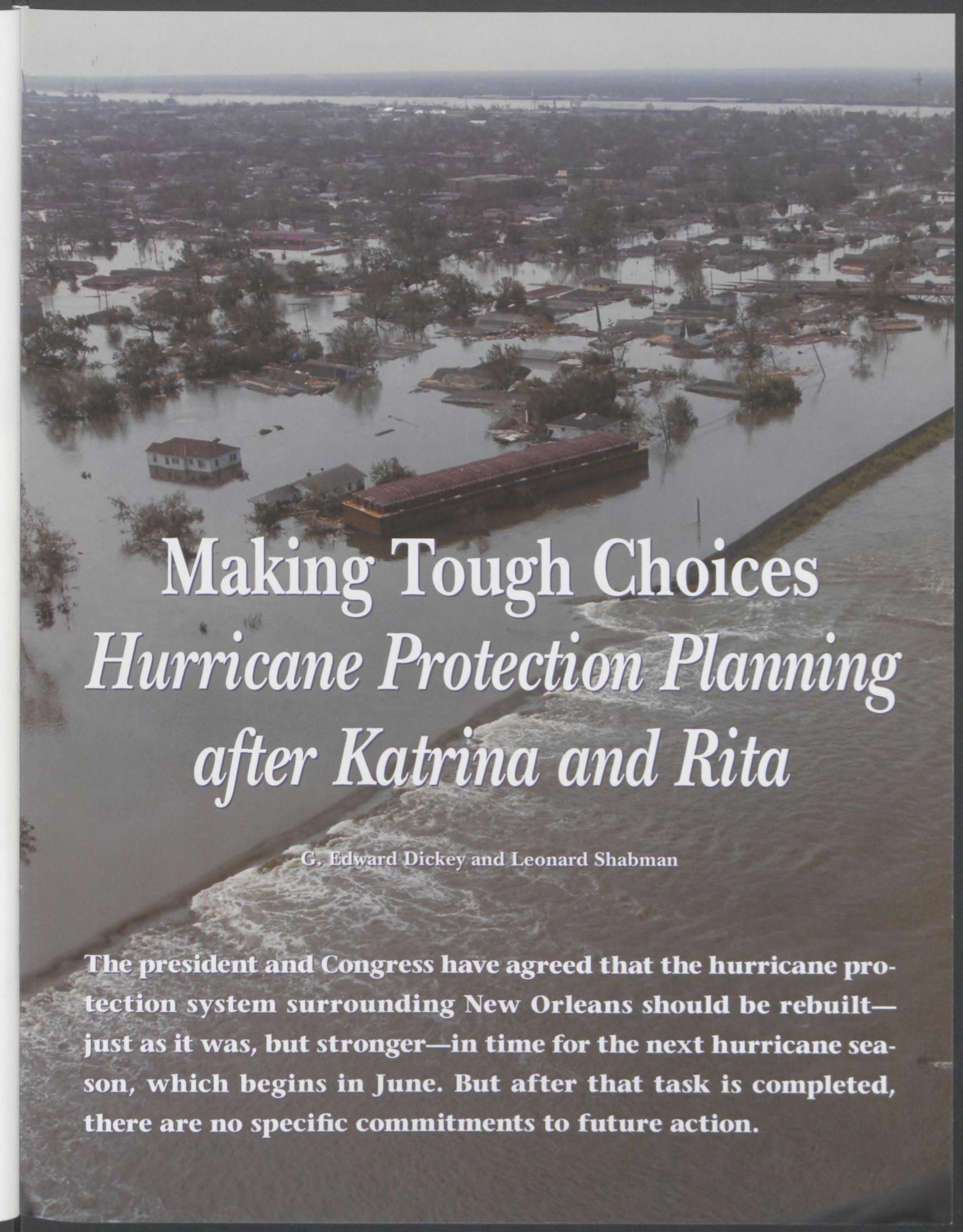
This research also indicates that subsidizing one specific ACT throughout the world could result in much faster emergence of resistance than if two or three combinations were used that had unrelated partner drugs to artemisinin. The underlying intuition is simple. Using a single combination in all regions places greater selection pressure for parasites to become resistant to that combination. Use of different combinations relieves the selection pressure for resistance to evolve to any single combination. To take the thought experiment further, if we were able to treat every single malaria patient with a completely unique drug or combination, the likelihood of resistance developing to each of these drugs would be infinitesimal. In general, the idea of using the same ACT combination worldwide deserves serious reconsideration. Moreover, different ACT combinations may, if priced effectively, drive out monotherapies by offering consumers a choice of different antimalarials with different dosing schedules and other attributes.

The effectiveness of antimalarial drugs is a global public good, of particular value in malaria-prone regions that also are among the most economically impoverished parts of the world. Inappropriate drug use in neighboring countries reduces the incentive of any given country to deploy drug regimens that may be rapidly undermined by resistance originating outside their borders. Therefore, a case can be made for globally coordinated action and fiscal support to protect the effectiveness of these valuable drugs. If we are smart in how we deploy the ACT drugs, there is a real promise of making sure that millions of children in Africa will reach adulthood. ■

Further Reading

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- Laxminarayan, R. (2004). Act Now or Later? Economics of Malaria Resistance. *American Journal of Tropical Medical Hygiene* 71 (2 Suppl): 187-95.
- Laxminarayan, R., M. Over, and D. Smith. Will a Global Subsidy of Artemisinin-Based Combinations (ACTs) for Malaria Delay the Emergence of Resistance and Save Lives? World Bank Policy Research Paper, WPS3670.

All photographs on pages 25-27: © L. Pfitzner-Anderson, Roll Back Malaria Partnership Secretariat, World Health Organization



Making Tough Choices *Hurricane Protection Planning after Katrina and Rita*

G. Edward Dickey and Leonard Shabman

The president and Congress have agreed that the hurricane protection system surrounding New Orleans should be rebuilt—just as it was, but stronger—in time for the next hurricane season, which begins in June. But after that task is completed, there are no specific commitments to future action.

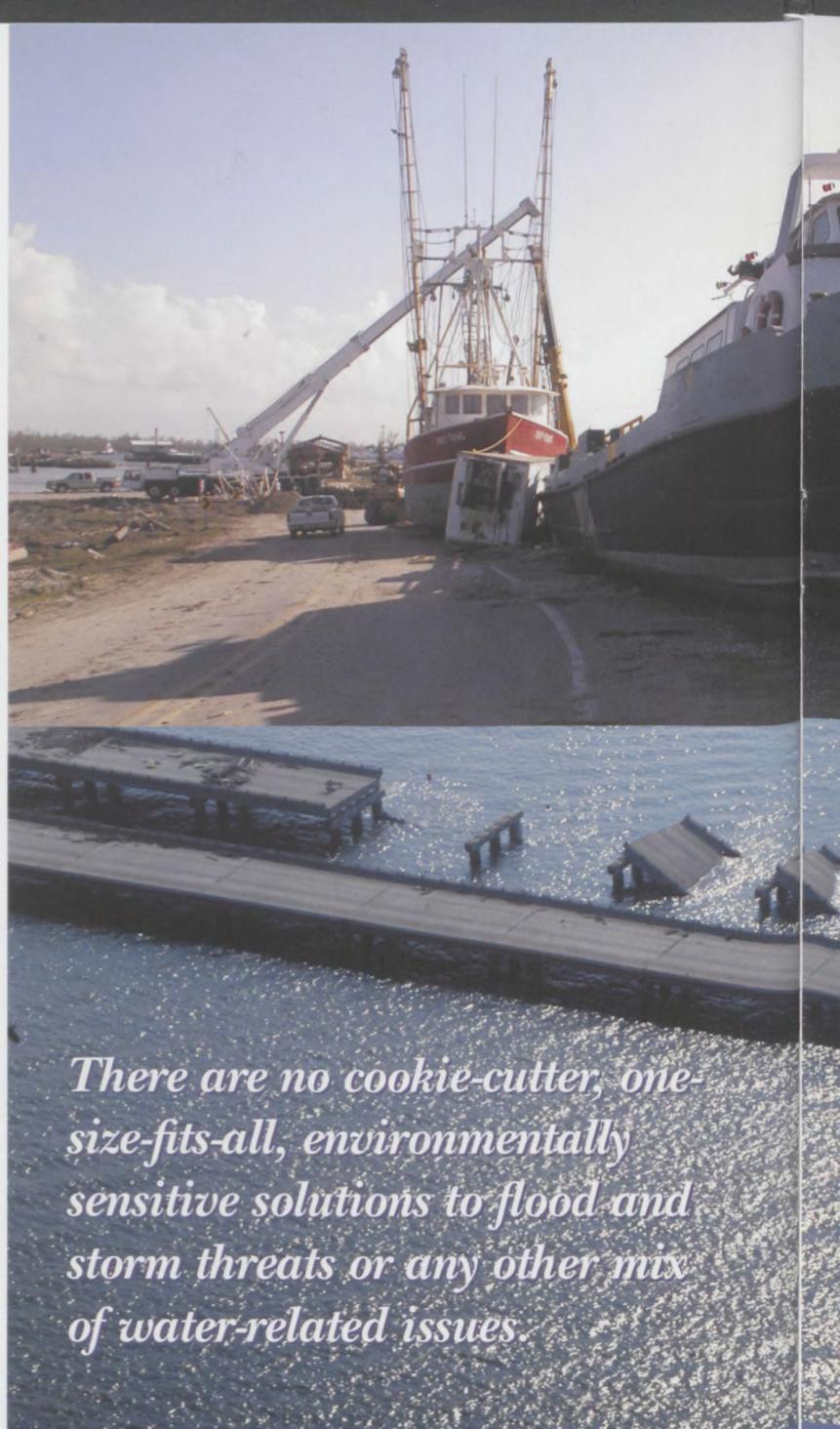
It's not for a lack of vision about what the future could include; there's been talk of a hurricane barrier spanning the coast and bold new projects to restore coastal barrier islands and wetlands that will dampen the force of future storms. Meanwhile, proposals for port and navigation improvements continue to be made. A price tag for all these projects might exceed \$50 billion, an amount equal to the total budget of the Army Corps of Engineers for the past decade. Clearly, federal, state, and local governments will confront more demands for their budgetary resources than they can satisfy. The reality is that many problems must remain unaddressed or incompletely solved, and many opportunities left to the future.

Despite this fiscal reality, many are clamoring for systems of dikes and flood gates such as those that protect the Netherlands or that are in place on the Thames River in England, without knowing the technical feasibility, economic costs, or ecological consequences of such a project for the Louisiana coast. The extensive damage from Katrina and Rita does not make it any less important to ask whether the costs, financial and environmental, of a "Dutch solution" can be justified for Louisiana's sparsely settled coast. Other alternatives must be examined, including those that protect smaller areas against extreme hurricane events with defenses around population centers; rely on landscape and wetlands restoration to moderate storm surges; and, in some areas, elevate buildings and even encourage and manage retreat from the coastline.

But the best investment strategy can be devised only if it is supported by credible analysis. Congress has long required comprehensive economic and environmental assessments from the water resources agencies, such as the Corps of Engineers, so it can make more informed spending choices. To be sure, questions about the Corps' economic and other analyses have been raised by scientific panels, the Office of Management and Budget, and nongovernmental organizations. Still, the nation's commitment to, and the open debate over, economic and environmental analysis of individual projects is critical to public investment decisionmaking.

Nonetheless, in the rush to respond to Katrina, there have been congressional directives to bypass economic and environmental analysis for new storm damage protection projects. However, an important distinction between economic analysis and economic justification must be made. A benefit-cost analysis need not be the sole determinant of whether hurricane protection systems should be put in place or enlarged, but economic information can still be used to help set investment priorities.

For example, Louisiana coastal restoration plans have been criticized for their lack of economic analysis, even though



There are no cookie-cutter, one-size-fits-all, environmentally sensitive solutions to flood and storm threats or any other mix of water-related issues.





much of the justification for that restoration includes storm damage reduction, infrastructure protection, and commercial fishery enhancements. These are effects that have been traditionally included in an economic analysis of federal water project investments and are equally relevant to assessing investments in wetlands restoration. At the same time, restoration projects may cause adverse effects for navigation, port access, and oyster production—all costs that are amenable to appropriate economic analysis. Properly calculated and utilized economic analysis of effects on storm damage reduction, navigation, and commercial fisheries can add useful information when making choices about how to deploy limited resources to best balance unavoidable competing demands.

A useful economic analysis does not require placing monetary values on all the outcomes of an investment. Some ecosystem outcomes (for example, assimilation of excess nutrients like nitrogen and phosphorous) or outcomes that increase the protection of human life need not be represented in monetary terms. A useful analysis will report the added costs incurred to secure additional benefits, even when benefits are not monetized. Benefits can instead be represented as physical or biological performance measures such as acres of wetlands created, pounds of nutrients removed from the water, or reductions in the population at risk of catastrophic flooding. This kind of information helps decision-makers weigh increased costs against successive increases in the performance measures.

Systematic analysis evaluates what makes common sense. For example, investment in hurricane protection should be focused on where the populations and communities will likely be located in the future. It is likely that some coastal communities, indeed parts of cities such as New Orleans, will decline or even disappear. This process may have already begun before the hurricanes, and it is clear that many residents will not return to some areas. This is why an alternative such as a hurricane barrier that protects the whole coast from storm surge will need to be carefully justified.

As another example, we now understand that protection works allow, and indeed encourage, new patterns of economic activity and change where and how people live and work. Yet in the end, no hurricane protection works are truly fail-safe. Risks will always remain after any plan is implemented. However, the historic focus of storm damage economic analysis was on reduction of inundation damages to property. Clearly, as demonstrated by the New Orleans experience, insufficient attention was paid to this “residual risk” and to the vulnerability of the occupants of protected areas when project protection proved inadequate.

Congress should require the federal agencies that are

responsible for project evaluations to predict changes in the location of human activity and private investment that will be located in the protected area and estimate the costs of damages if the project does fail. That expected cost must be a part of the benefit-to-cost comparison and bear on the project's justification. In turn, local adoption of strict and enforced zoning and building codes, as well as the maintenance of evacuation plans to minimize this residual risk cost, can be made a condition of the project's construction. These are not new ideas but they have been resisted for years. The time may be ripe for agencies to report the residual risk costs of project investments.

Structural protection projects must also be better coordinated with a reformed National Flood Insurance Program where insurance premiums reflect storm damage risks. Premiums that reflect residual risk provide information to individuals and communities on just how risky their decisions are when they locate a home or business and choose construction practices. The need to require property owners to buy flood insurance for all properties at risk is well recognized, as are many other reform needs for that program's successful operation.

What is less well understood is the perverse incentive effect of the flood insurance program's organization around the concept of a "100-year" storm. A 100-year storm has a 1 percent chance of occurring in a given year but has a significant likelihood of occurring during the mortgage term of most homeowners. In the same way, a more severe, but less likely storm, such as Hurricane Katrina, has a significant likelihood of happening over this same time horizon.

However, properties located outside the "100-year floodplain" are not subject to the requirements of the National Flood Insurance Program. Individuals assume that the absence of an insurance purchase requirement means that there is no risk at all outside the 100-year flood zone. Meanwhile, communities sometimes seek a federal storm damage reduction project to remove the community from the requirements of the flood insurance program in order to allow development behind levees and other storm protection projects that have a very real residual risk. Congress should require properties that benefit from a federal storm damage reduction project to maintain insurance policies against residual flooding risk.

Finally, it is now clear that there must be a broader and more comprehensive coordination of storm protection planning with other projects and their purposes. In the urgency to examine new storm protection projects, these interrelationships cannot be ignored. Too often in the past, insufficient attention was paid to the interactions between engi-

neering structures, which extensively modified hydrologic regimes, and the physical and biological environment. One result was that extensive engineering efforts for managing the Mississippi River and numerous large-scale coastal navigation and storm-damage reduction projects caused widespread, ongoing changes in wetlands and barrier island stability, some say magnifying the storm damages that were realized in the recent hurricanes. Many of these changes either were not foreseen or, if anticipated, were considered to be an acceptable cost of progress on other fronts.

Looking forward, we now understand that some hurricane protection projects may have adverse effects on navigation access or on the coastal landscape. Some wetlands restoration projects will favor a commercially valued fish over a fish with high recreational value. Restoration of the landscape in one area may claim river sediments that could have built land elsewhere in the coastal region. But there may also be project and program complementarities. A navigation channel may serve as an excellent conduit for moving sediment-laden water to areas where a wetlands restoration project is being proposed; in turn, that wetland area may help moderate storm surges and reduce storm damages.

As Congress continues to rely on location-specific water resource studies when deciding to authorize and fund measures to reduce the hurricane and flood threat, it should also demand that plans fully recognize these complexities, interdependencies, and tradeoffs. We know enough and have the tools to do such analysis, to plan smarter, and to invest more wisely. At the same time, each planning situation is unique in terms of the issues to be addressed and the opportunities to address them.

There are no cookie-cutter, one-size-fits-all, environmentally sensitive solutions to flood and storm threats or any other mix of water-related issues. A commitment to sound analysis and rigorous consideration of difficult but unavoidable tradeoffs will be required as the urgency of the post-Katrina moment passes and is replaced by the tough job of making hard investment choices. ■

Further Reading

Working Group for Post-Hurricane Planning for the Louisiana Coast. *A New Framework for Planning the Future of Coastal Louisiana after the Hurricanes of 2005*. Cambridge, MD: University of Maryland Center for Environmental Science, 2006. Available at www.umces.edu/la-restore.

This article is based on testimony given by one of the authors, G. Edward Dickey, before the Water Resources and Environment Subcommittee, House Committee on Transportation and Infrastructure on October 27, 2005. Available at www.house.gov/transportation/.

All photographs courtesy of FEMA: page 29, Jocelyn Augustino; page 30-31, Marvin Nauman (top and bottom), Win Henderson (center).

RFF Board Elects Esty, Yale Law School Professor

Calling the RFF team a group of “stars in the environmental constellation,” Yale Professor Daniel C. Esty joined the RFF Board of Directors for a three-year term that began in January. “I consider RFF to be the pre-eminent environmental think tank in the United States and perhaps the world,” Esty says, citing its record of “putting important ideas into the public policy debate.”

Esty is Hillhouse Professor of Environmental Law and Policy at the Yale Law School and the School of Forestry and Environmental Studies. He also directs the Yale Center for Environmental Law and Policy, which seeks to advance fresh thinking and analytically rigorous, interdisciplinary approaches to environmental decision-making. He also heads the Yale World Fellows Program, which brings to Yale mid-career professionals from around the globe to explore critical issues, contribute to international awareness, and prepare for leadership roles.

Esty earned his law degree at Yale, where he was coordinator for the school’s environmental litigation program and editor of the *Yale Journal on Regulation*. As a young lawyer in a District of Columbia corporate firm, Esty did some pro bono work for environmental groups and was tapped by William Reilly, EPA administrator under President George H.W. Bush, to join the agency. There, looking for

new ideas in environmental regulation, he encountered RFF studies. “It was impressive,” Esty recalls, “to see this group producing important ideas and analyses about how we might do environmental protection differently and better.”

One of his first challenges at EPA was the Exxon Valdez oil spill crisis of 1989. Later, serving as Reilly’s chief of staff, Esty was responsible for coordinating policy on the 1990 Clean Air Act Amendments and other regulatory reform and enforcement efforts, as well as preparing for the 1992 UN Conference on Environment and Development—the “Earth Summit”—in Rio de Janeiro. He then managed the EPA policy office, overseeing initiatives on climate change, trade and the environment, and energy and the environment. In 1998, he returned to Yale as associate dean for the School of Forestry and Environmental Studies.

Esty is co-editor, with Marian Chertow, of *Thinking Ecologically: The Next Generation of Environmental Policy*, published by Yale University Press in 1997. Chapters consider what has worked well in environmental law and policy over the past several decades—and what has not.



DANIEL C. ESTY

“We’re moving toward a world of new and more diverse approaches to regulation,” Esty says. Some command-and-control approaches will continue, he believes, but he foresees more information strategies, economic incentives, market-based regulations, and pressure from the marketplace as consumers, investors, and other participants become increasingly focused on environmental issues.

Other books co-edited by Esty include *Global Environmental Governance: Options and Opportunities* (Yale School of Forestry and Environmental Studies, 2002), *Regulatory Competition and Economic Integration: Comparative Perspectives* (Oxford University Press,

2001), and *Sustaining the Asia-Pacific Miracle: Environmental Protection and Economic Integration* (Institute for International Economics, 1997). Asia, he says, represents a great case study for the concept of sustainability: “The long-term payoff to efforts to promote economic growth will be diminished if environmental challenges are not addressed.”

Esty holds a bachelor’s degree in economics from Harvard and earned first-class honors in philosophy, politics, and economics at Balliol College, Oxford. A hiker with a long-time interest in environmental concerns, Esty considers it fortunate “when a personal interest can be a professional opportunity.” ■



In off-the-record sessions on "The Evolving Environmental Movement," RFF Council members at their October meeting heard perspectives from a wide range of representatives of the environmental and energy policy communities, including major foundations and advocacy groups. In a session focused on new entrants to the environmental policy field, RFF Board Member David Hawkins, director of the Climate Center at Natural Resources Defense Council, moderated a discussion with Adam Meyerson, president of the Philanthropy Roundtable; Ann Korin, co-director of the Institute for the Analysis of Global Security; and Jim Ball, executive director of the Evangelical Environmental Network.

RFF Announces Major Conference on Frontiers of Environmental Economics

Continuing its longstanding role as a center for new thinking on environmental economics, RFF will host a special conference in Washington, DC, February 26–27, 2007, on the "Frontiers of Environmental Economics." The session will extend RFF's historical efforts to advance prescient and seminal research in the field.

Supported by EPA's National Center for Environmental Economics, the conference will showcase 12 competitively chosen, commissioned papers.

An honorarium of \$4,000 will be provided to authors of accepted papers.

Abstracts must be submitted as a PDF file attachment and emailed to John@rff.org by April 1, 2006. The acronym FEE should be included on the subject line. Notification of acceptance will be made by May 15, and authors must complete contracted papers by February 1, 2007.

Alan Krupnick, an RFF senior fellow and principal organizer of the conference, aided by Joseph Aldy, an RFF fellow, encourages submissions from academics of any discipline who can contribute to identifying or resolving important policy problems at the forward edges of environmental economics. "We welcome the participation of social scientists and non-economists who will help pioneer the next stage of critical thinking on environmental and natural resource policies," Krupnick said.

In addition to Krupnick and Aldy, the Paper Selection Committee will

include Catherine Kling, Iowa State University; John List, University of Chicago; Paul Portney, University of Arizona; and V. Kerry Smith, North Carolina State University.

Since the mid-1970s, RFF has convened landmark conferences highlighting the growing role of economics in environmental policymaking. Indeed, RFF's experience with environmental economics dates from before the topic was recognized as a distinct academic discipline. Research results from these events have been recognized as signal pronouncements in such areas as valuation of environmental and health benefits, discounting and intergenerational equity, and the design of market-based incentives and approaches to environmental problems.

A formal description of the Call for Abstracts, and procedures for submission, is available at www.rff.org/frontiersconference. ■

Examining China's Mineral Consumption



In his December 14 speech, "The Hungry Giant: China and Minerals," Colorado School of Mines and Pontificia Universidad Católica de Chile mineral economics professor John E. Tilton said that China's consumption of minerals should be welcomed, not feared. The annual lecture was held in honor of Hans H. Landsberg, one of RFF's founding fathers.

To assess whether economic development in China poses a threat to the availability of mineral commodities for developed countries, Tilton presented two views of mineral availability: the fixed-stock paradigm and the opportunity-cost paradigm. The first, he said, emphasizes that since Earth is finite, the available stocks of mineral commodities are fixed. Demand, on the other hand, is variable. According to this view, it's only a matter of time before the fixed stock is consumed.

According to the second model, whether scarcity becomes a problem depends on a "race" between new technology and the effects of depletion. Unlike the fixed-stock paradigm, Tilton explained, "scarcity is not something that will come suddenly like a car speeding along the highway and running out of gas."

Applying these models to China, Tilton suggested that the fixed-stock paradigm best explains short-run mineral availability and the opportunity-cost paradigm best describes long-run

Economic development in China and other developing countries literally means a better life for hundreds of millions of people.

availability. In China today, he said, supply is not sufficient to satisfy demand at past price levels. Between the resulting higher prices and scarcity caused by inadequate supply, short-term, self-correcting problems can occur.

Turning to a longer view, Tilton said that although it is counterintuitive, mineral commodities today are more available for developing countries than they were for developed countries a century ago. He attributed this to the innovative technology that has sprung from the wealth presumably generated by past consumption of mineral resources. While there is no way to be sure this will remain true for China looking forward, he said, it is at least possible.

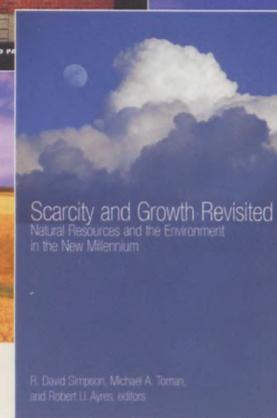
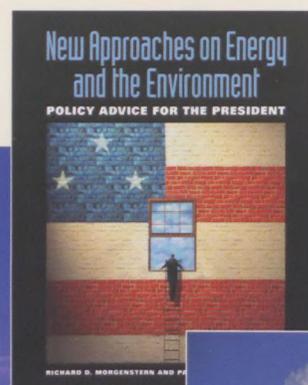
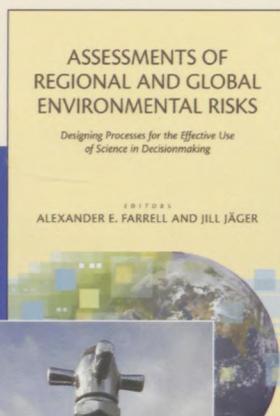
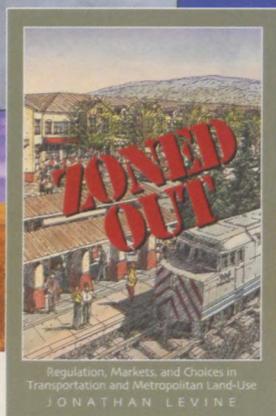
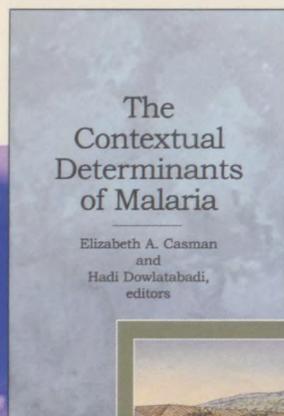
In his concluding remarks, Tilton stressed that China's efforts to secure mineral resources should be encouraged. "In a world where, historically, most people have lived in poverty," he said, "economic development in China and other developing countries literally means a better life for hundreds of millions of people." ■

Resource Links

Learn more about the feature stories in this issue. The following links will take you to special pages on the RFF website, where you will find additional resources:

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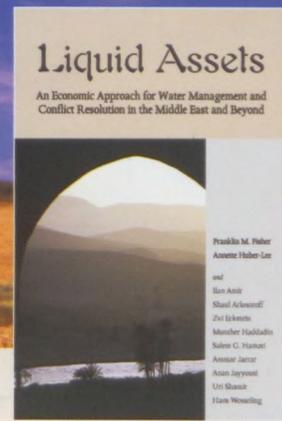
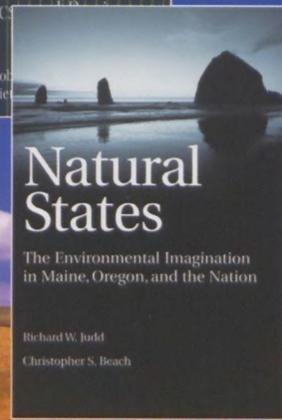
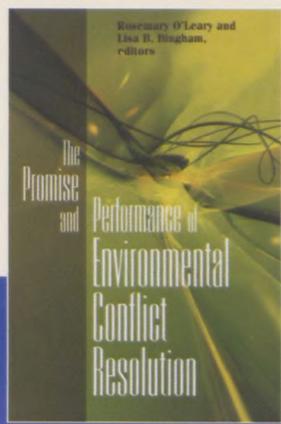
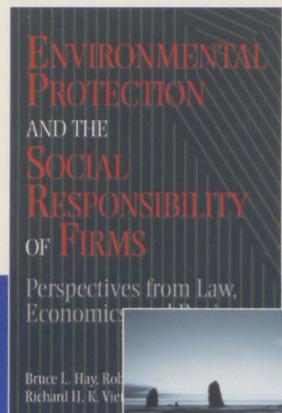
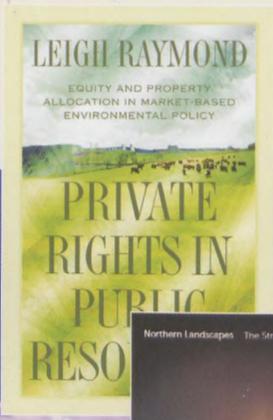
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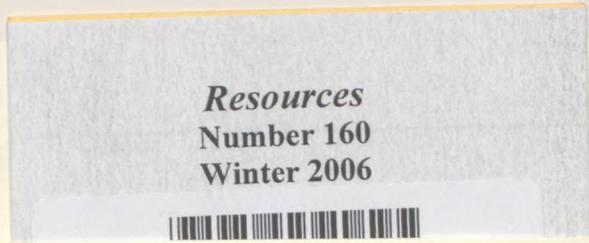
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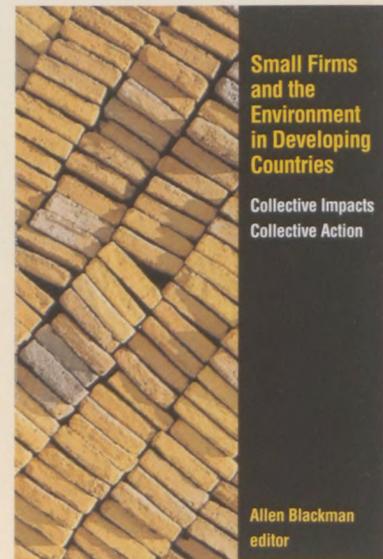
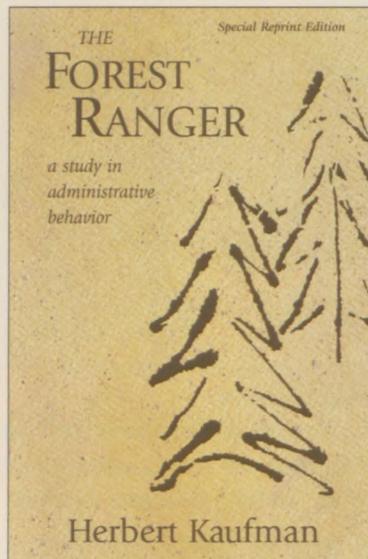
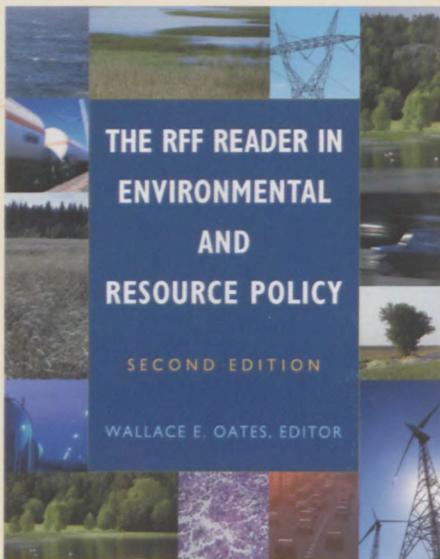
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