CLIMATE ACTION GOES LOCAL

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About This Issue

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In 2010, Mexico City introduced the largest bike-sharing program in North America to reduce air pollution from private cars and taxi cabs.

As a global phenomenon, climate change is an issue that we usually look to the international community to address. Local communities, however, are increasingly taking the lead in developing innovative, grass-roots approaches to mitigating and combating the causes and effects of global warming. According to a study by the United Nations Development Program, most investments to reduce greenhouse gas emissions and to adapt to climate change *must* take place at the local level. In the United States, local governments and private citizens have been working to cut those emissions, without waiting for solutions at the international level.

This issue of *eJournal USA* examines what it means to think globally about climate change — and to act locally. *Climate Action Goes Local* shows how communities and non-profit groups worldwide are initiating programs that counter climate change, and why leadership from local officials and buy-in from local populations and businesses are necessary for such programs to be effective. An excerpt from *Local Action*: *The New Paradigm in Climate Change Policy* by Tommy Linstroth and Ryan Bell outlines advantages local governments have over higher-level governments in developing, monitoring and adapting climate change programs to serve their constituencies.

This volume also recounts how local governments, businesses and communities in Central America, East Asia, Middle East, Southeast Asia and the United States are partnering to leverage their resources, thereby multiplying the impact of their programs.

AP Images

Baoding, China, is transforming itself into a manufacturing center for renewable energy equipment.

The success of the local efforts described herein suggests that local governments and communities are well positioned to achieve tangible environmental benefits without sacrificing economic growth and development.

The Editors

The 2006 Copa de Balonismo at Barigui Park in Curitiba, Brazil. Curitiba boasts close to 30 parks and wooded areas.

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Seattle's Climate Strategy Pays Off

Jonathan Hiskes

AP Images

Facing the threat of water shortages stemming from global warming, Seattle has changed its energy and water policies.

It is difficult to imagine a water shortage in Seattle, Washington. In this famously drizzly city in the Northwestern United States, views of Puget Sound and freshwater lakes beckon from almost every hilltop. Two snow-capped mountain ranges, the Olympics and the Cascades, rise on the city's eastern and western flanks.

Yet the threat of water shortages — triggered by glacier melt and accelerated by warming temperatures — has inspired the city of 609,000 to embark on one of the most ambitious climate protection plans in the nation. The city has launched plans to cut energy waste by insulating and retrofitting buildings, to reduce driving by building new transit networks, and to position itself as a hotbed of clean-energy jobs and innovation.

The results have been clear for several years: In 2008 — four years ahead of a deadline —Seattle met the Kyoto Protocol goal of reducing its **greenhouse gas emissions** 7 percent below 1990 levels set for the United States. Seattle's leadership inspired more than 1,000 other U.S. cities and towns to agree to the same target.

Former Mayor Greg Nickels, who led the city from 2002 through 2009, said it all started with dire warnings about water supplies.

"When I became mayor, climate was not on my list of to-dos," he said. "I filled some potholes and had to deal with the aftermath of 9/11, trying to put people back to work. I assumed a couple of things: One, that climate change was something that was off in the future and would happen to other places first. And two, that the federal government was doing something about it. I was wrong."

Mayor Leads The Way

The urgency of the threat hit home, city insiders say, during a senior staff meeting in January 2005. The city's utilities director told Nickels that melting glaciers could

AP Images

As Mayor, Greg Nickels was instrumental in devising a climate strategy for Seattle and in reaching out to other U.S. cities in the mid-2000s.

create water shortages much sooner than the public expected. And because most of the city's power supply comes from hydroelectric dams, water shortages could also create an energy crisis.

At the same time, 141 countries were about to ratify the Kyoto climate treaty, without the participation of the United States. Nickels told his staff that Seattle had to step forward even if the federal government wasn't ready.

> The city's utilities director told Nickels that melting glaciers could create water shortages much sooner than the public expected.

"He put his hand down and looked across the table, and said, 'We aren't thinking big enough,'" recalled Mike Mann, the former director of the city's Office of Sustainability and Environment. When the mayor mentioned signing the Kyoto treaty, Mann said, "Staff members' jaws kind of dropped as they realized he was dead serious."

Nickels launched the U.S. Mayors Climate Protection Agreement to enlist other mayors in committing to the **greenhouse gas emissions** targets. Later that year he traveled to the United Nations climate talks in Montreal to spread the message that plenty of U.S. local leaders were prepared to act on climate change.

Back at home, he had to convince Seattleites that it was time for bold steps. Most of Seattle's electricity comes from hydroelectric dams, which have a much lower **carbon footprint** — an estimate of how much carbon dioxide is produced by an entity such as a company — than coal- or gas-fired power plants. That means the bulk of the city's **greenhouse gas emissions** come from transportation, and that replacing car trips with transit is key to cutting the city's **carbon footprint**.

Density: A New Concept For Seattle

Nickels understood that compact, walkable neighborhoods were necessary to support bus and light-rail networks. But while the city abounds with nature lovers drawn to the nearby mountains and waterways, many of them don't see the connection between protecting the environment and higher **housing densities** in their urban neighborhoods. Seattle is one of the largest American cities with more single-family homes than high-density mulit-unit dwellings.

"I don't believe citizens have fully embraced the importance of dense, compact neighborhoods," said Mann, who now works as an **environmental sustainability** consultant to the city.

For example, a plan to allow taller buildings near a new light-rail station in the Mount Baker neighborhood has faced opposition from local residents concerned that greater density would bring traffic congestion and crime. "People need yards and open space to be mentally healthy," Pat Murakami, a nearby resident, told the *Seattle Times*. "Are we supposed to live like sardines crammed into a can?"

To make the case for higher **urban density**, the city has had the help of an energetic group of sustainability advocates. Seattle-based writer Alex Steffen promotes "bright green urbanism," the idea that marrying environmental values with technology and **smart land use** allows city neighborhoods to be more social, healthy and prosperous than auto-dependent suburbs. Local non-profits Climate Solutions, Great City and the Sightline Institute work to link the environmental leanings of Seattleites with large-scale public plans.

"I want to participate in a real revolution, not make futile gestures," Climate Solutions Policy Director KC Golden said. "That's why retreating back to just private and local action alone won't work."

The centerpiece of Seattle's green urban vision has been the remaking of the South Lake Union neighborhood near downtown. A decade ago, the site was an expanse of car lots and underused warehouses. Through partnerships between the city and private investors, it has become a bustling high-tech corridor anchored by nine buildings that house the headquarters of online retailer Amazon.com, Inc. The transformation has worked, says Mann, because it included things

AP Images

The city has invested in public transportation, including light rail, to reduce the source of most of its **greenhouse gas emissions** — cars.

that appeal to residents and office workers: a streetcar line, shops and restaurants, and a waterfront park where a Navy shipyard once stood.

"When you increase **[urban] density**, it's got to work for people," Mann said. "It's got to have amenities and public spaces and not just big Soviet-style housing towers that people don't want."

> "I don't believe citizens have fully embraced the importance of dense, compact neighborhoods."

Cars Versus Trains

Elsewhere, reducing transportation emissions has been more difficult. The city and state are poised to begin construction on a multi-billion-dollar road tunnel beneath the downtown waterfront. The plan includes no room for rail lines, and sustainability advocates say investing so heavily in an auto-only project is short-sighted.

Nickels, after negotiating to trim the size of the tunnel, agreed to support it. Many believe that decision cost him the environmental vote in the 2009 election, leading to an unexpected victory by environmentalist Mike McGinn.

But the progress of the campaign Nickels started has continued under the new mayor. The city is building out a 15-year light-rail plan that Nickels promoted and voters approved. Recycling and compost rates are among the highest in the nation. Cruise ships bound for Alaska now plug into the electric grid while at port, rather than idling their engines along the waterfront.

Leaky Buildings Get Makeover

Perhaps most promising, the city has launched an innovative program to reduce energy waste from leaky buildings. In the United States, buildings account for nearly 40 percent of **greenhouse gas emissions** nationwide. Seattle's Community Power Works program, backed by $20 million in federal economic

stimulus (American Recovery and Reinvestment Act) funds, aims to fix several of the barriers that keep owners from retrofitting their buildings.

First, it offers low-cost ($95) energy assessments to help home and business owners understand where their buildings are wasting heat and electricity. Second, it partners with the community investment institution Enterprise Cascadia to offer 20-year loans for energy-efficiency investments. This solves the finance dilemma for many homeowners — investments such as good insulation and duct sealing pay for themselves over time but carry steep upfront costs.

Finally, Community Power Works is piloting a "carbon reduction incentive fund," essentially a reward-based carbon market that pays building owners subsidies based on the amount of carbon dioxide emissions savings they achieve. Community Power Works is modest in scope; it aims to retrofit 2,000 homes, along with businesses and hospitals. But by testing out new ideas, its full influence could be much greater.

> Cruise ships bound for Alaska now plug into the electric grid while at port, rather than idling their engines along the waterfront.

"Cities are the location of a lot of emissions because they're centers of industry and population," Mann said. "But they're also laboratories for solutions. They're going to generate the ideas the federal government will come back to, at some point, out of necessity." ■

Seattle journalist Jonathan Hiskes writes about clean technology, environmental innovation and the urban environment. He is the Pacific Northwest correspondent for Sustainable Industries *magazine.*

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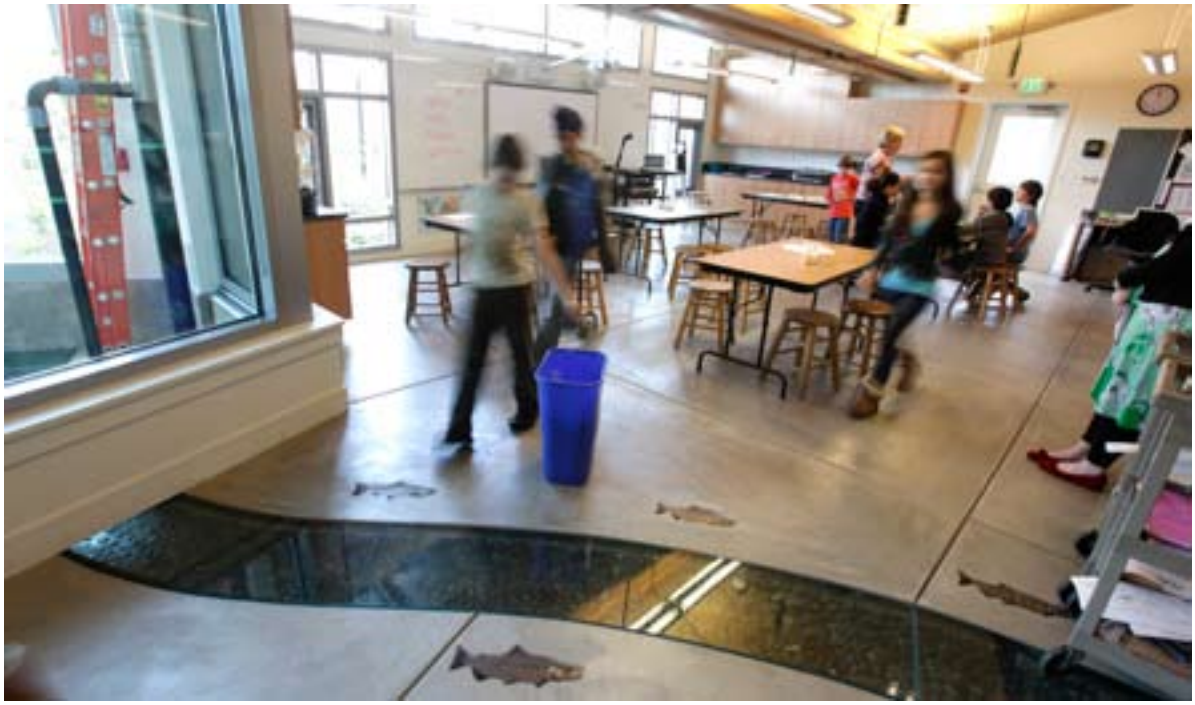
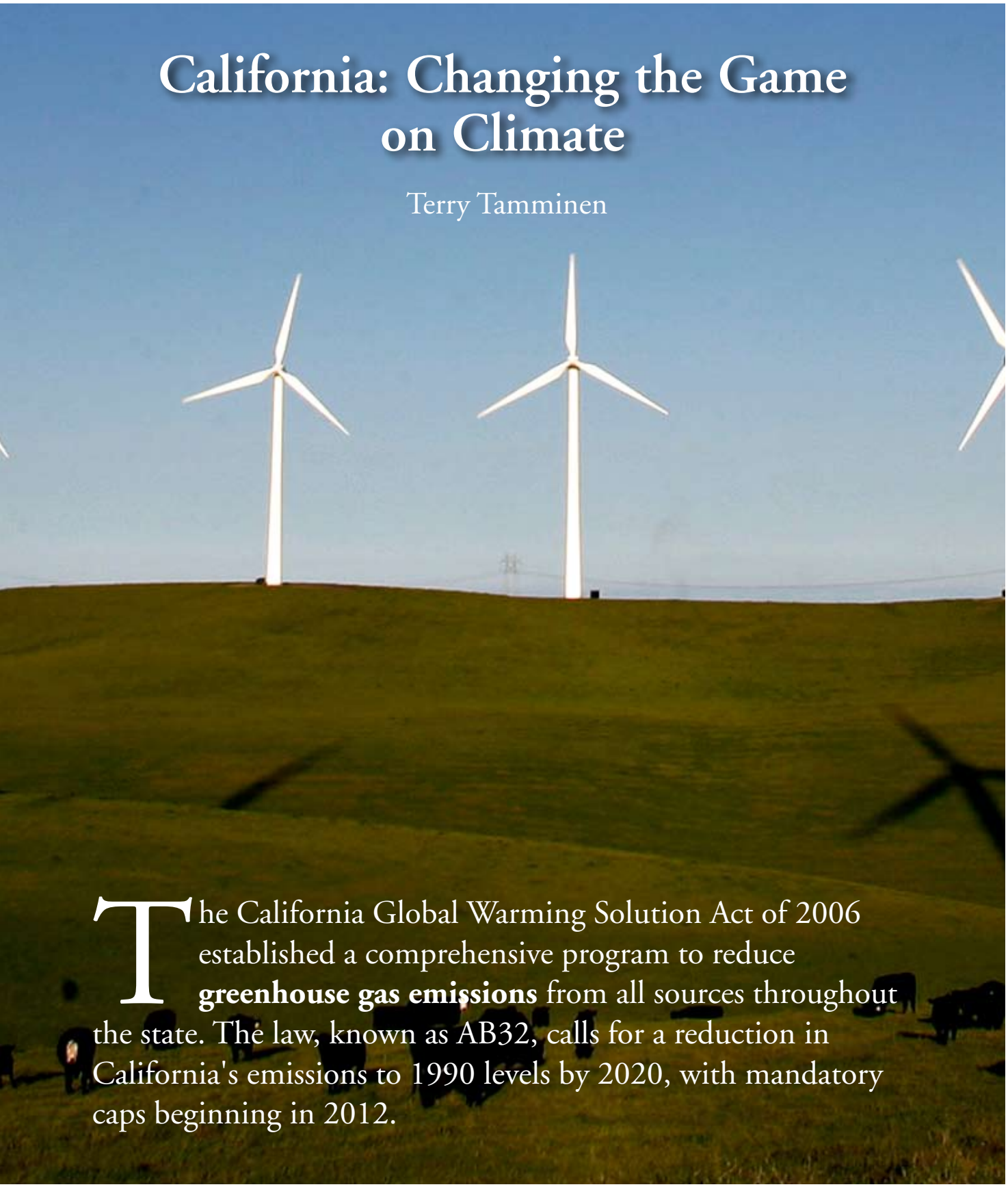


AP Images

The Bertschi elementary school in Seattle is among several dozens schools nationwide that recycle rainwater and wastewater.

California: Changing the Game on Climate

Terry Tamminen



The California Global Warming Solution Act of 2006 established a comprehensive program to reduce **greenhouse gas emissions** from all sources throughout the state. The law, known as AB32, calls for a reduction in California's emissions to 1990 levels by 2020, with mandatory caps beginning in 2012.

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This fuel station in San Francisco is one of about 200 in California that offer compressed natural gas for vehicles.

California's Global Warming Solutions Act of 2006 was passed to make a difference in California and the world. As head of the world's eighth-largest economy, then-Governor Arnold Schwarzenegger knew that California's policy approach to global warming could have an impact in the United States and around the world.

> "I'm more confident than ever that action taken at the state and local level will have a significant impact on lowering emissions."

When we first proposed the legislation to California lawmakers, we encountered the typical opposition from industry groups that feared new mandates would result in higher costs for businesses. We ultimately proved, however, that measures to solve climate change — including energy efficiency, the development of renewable energy and alternative transportation fuels, and **carbon trading** — would boost the economy and create thousands of new jobs. *(See "Cisco: California's Climate Law Is Good for Business" on page 12 for more about California's climate legislation and job creation.)*

California Inspiration

Since AB32 was enacted five years ago, other states in America have followed California's lead. Our state's climate policies have inspired a majority of U.S. states to move forward on a range of climate change mitigation actions. Many states have developed climate action plans that include specific greenhouse gas reduction targets. They have also established **renewable portfolio standards** that require power producers to generate a certain portion of their energy from clean sources, and passed legislation that addresses transportation, energy efficiency and other climate-related needs.

Together, these efforts are having a significant impact on America's **greenhouse gas emissions** and helping the United States meet the non-binding emissions target President Obama announced at the 2010 climate summit in Copenhagen: a 17-percent reduction below 2005 levels by 2020. In fact, U.S. emissions have been falling since 2007, mainly because of the economic recession. But in the future, these emissions are expected to grow much more slowly than they did in recent decades, thanks

to current investments in renewable and clean technology and alternative fuels, the U.S. Department of Energy says.

California As International Player

California's actions have also had an impact on policies overseas. In September 2009, California and more than 30 other U.S. states hosted the first Governors' Global Climate Summit in Los Angeles, drawing some 1,200 participants from across the world. The summit focused on action being taken at the state and local level and how those actions are building **environmentally sustainable** economies while simultaneously reducing **greenhouse gas emissions**.

Meeting again the following year, Governor Schwarzenegger joined other prominent leaders at the summit to announce a new global organization, the R20-Regions of Climate Action. The goal of R20 is to develop and implement low-carbon and climate-resilient projects through cooperation among local governments around the world. By building a new green economy, the group says, global carbon dioxide emissions can be reduced by 75 percent by 2020 and increases in Earth temperatures can be capped at 2 degrees Celsius — a goal scientists say will help us avoid catastrophic climate change.

AP Images

As California Governor, Arnold Schwarzenegger promoted renewable energy through legislation, executive powers and his personal endorsements.

The Momentum Holds Up

As expected, there have been some attempts to derail the momentum put in play by California's historic climate law. A proposition supported by oil companies was placed on the ballot in November 2010. Proposition 23 sought to freeze AB32 until California's unemployment rate dropped below a certain rate. California voters had their say at the polls, defeating Proposition 23 by a 24-percent margin, which says a lot about what is important to voters: a green economy, jobs and a healthy environment.

AB32 was a game-changing piece of legislation because it put into law a roadmap for comprehensive action on climate change. Having been involved in the drafting of that law and now witnessing the tangible impact it has had on inspiring action across the country and rest of the world, I'm more confident than ever that action taken at the state and local level will have a significant impact on lowering emissions.

California is doing its piece to try to halt climate change, a truly global problem. ■

Terry Tamminen is president of Seventh Generation Advisors (SGA), a consultancy helping governments worldwide implement clean energy and climate change policies. Earlier, he served as the Secretary of the California Environmental Protection Agency for Governor Arnold Schwarzenegger and was the primary architect of the state's Global Warming Solutions Act of 2006.

Kristina Haddad and Sasha Abelson of SGA contributed to this article.

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Cisco: California's Climate Law Is Good for Business

Laura Ipsen

Getty Images

This nearly emission-free hybrid bus was introduced by San Francisco's Municipal Transportation Agency in 2008, as part of a pilot program, in partnership with Cisco.

In November 2010, voters in California — America's largest state with 37 million residents — turned down Proposition 23, a ballot proposal to delay the historic 2006 Global Warming Solutions Act. California's law, which went into effect in January 2011, is the first comprehensive legislative effort to reduce ***greenhouse gas emissions*** *in the United States.*

Supporters of the California climate law came from all sectors of society and included some of the largest U.S. corporations that make their headquarters in California.

In October 2010, just a few weeks before the referendum that would determine the future of California's Global Warming Solutions Act of 2006, I outlined in a blog posting why our company stood behind the law and why we were publicly urging Californians to do the same. Proposition 23 would have rolled back California's low carbon standard, the implementation of the world's second-largest **cap-and-**

Courtesy of Cisco

Cisco's Home Energy controller helps utility customers monitor and control their energy use.

trade market, and rules requiring utilities to source 33 percent of their electricity from renewable sources by 2020.Those who supported the ballot measure said the state climate law would cost jobs and deepen the economic recession. We argued that it would do just the opposite.

Investing In The Future

Our state is known for innovation and for making sometimes difficult decisions that will pay off down the line. California knows how to invest in the future, and at Cisco we know we must do the same.

Since our state legislature passed the law, California has become a magnet for investments in renewable energy and clean-energy jobs. Already by 2007, such industries supported 125,000 jobs in our state and that number reached 500,000 three years later, according to the California Employment Development Department.

Between 2005 and 2010, the state attracted more than $9 billion in clean-energy venture capital, nearly two-thirds of all such capital invested nationwide. It is no coincidence that, as of 2010, our state is home to five of the top 10 cities for attracting clean-tech startup companies, according to a report by SustainLane Government, a database of **environmentally sustainable** policies.

Such investments would have been threatened if Proposition 23 had passed and the climate law been stalled. It would have jeopardized California's leadership in innovation and created uncertainty among businesses about the state's commitment to building a green energy economy. It would also have threatened capital investments and put thousands of clean-tech jobs at risk.

AP Images

Actor David Arquette appeared in online videos, urging voters to oppose Proposition 23.

Good For The Environment, Good For Business

At Cisco, we see first hand why climate policies can be good for business. Our Connected Grid technology, for example, helps power companies supply electricity in a more efficient way and consumers and businesses better control their power consumption. Our products and services are in demand not only because it is in utilities' interest to cut expenses — but also because a number of them now have to change the way they do business under California's Global Warming Solutions Act, and under **carbon-fuel standards** enacted by other states. We are also tapping into the rapidly growing market for renewable power, most recently by deploying a unified Cisco network for First Wind's utility-scale wind farm in Utah.

When California voters turned down Proposition 23 with a 62-percent majority in 2010, they invested in the future of our state and in our nation. At Cisco, we were proud to be part of that effort. ■

Laura Ipsen is senior vice president and general manager at Cisco Systems, Inc., a San Jose-based networking technology company with more than 72,000 employees worldwide and $40 billion in 2010 revenues.

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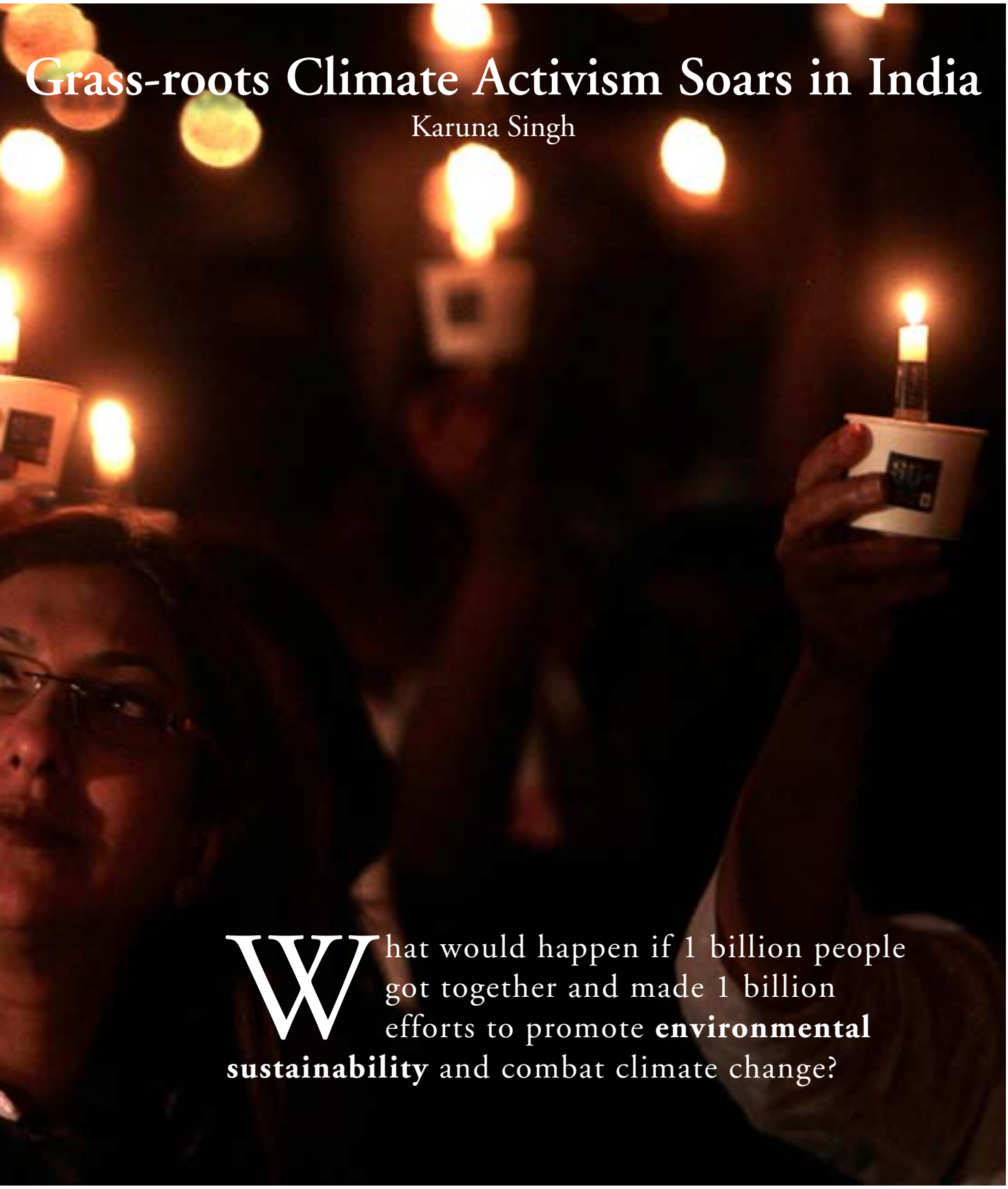
Grass-roots Climate Activism Soars in India

Karuna Singh



What would happen if 1 billion people got together and made 1 billion efforts to promote **environmental sustainability** and combat climate change?

AP Images

Courtesy of Earth Day Network - India

People in Kolkata marked Earth Day 2011 with pledges to take action to help the environment.

That was the central question guiding the global environmental advocacy group Earth Day Network in August 2010 as it opened its first office in India, a country where rapid economic growth is lifting millions out of poverty and providing those already in the middle class with enhanced purchasing power — all of which comes at an environmental cost.

The mission of the new Earth Day Network office in Kolkata is to help Indians recognize the threat and challenges posed by climate change, and to encourage each individual to take action to avert a looming environmental crisis. Through the campaign called A Billion Acts of Green, Earth Day Network seeks to frame the public discussion about climate change in India

The Challenge — And Power — Of A Billion Efforts

Satisfying the needs and aspirations of India's increasingly affluent population requires a delicate balance between fulfilling material needs and sustaining the country's fragile ecology.

With 1.2 billion people and one-third of the world's poor, India remains highly dependent on agriculture. The rural economy, coupled with a 7,500-kilometer-long coastline, makes India extremely vulnerable to climate change. Floods, droughts, heat waves, cyclones, storm surges, displacements, diseases and pests are no longer forecasts for a distant future; they are occurring today. Such challenges could severely test India's systems of governance and its institutional and social resilience.

So how can Indians be mobilized to tackle climate change?

To find out, Earth Day Network's India staff tapped Indian environmental leaders for advice on developing culturally appropriate, effective messages and strategies for Earth Day 2011.

Chaitanya Kumar, national coordinator for the Indian Youth Climate Network (IYCN), said that

Courtesy of Earth Day Network - India

Students in New Delhi participate in the 2011 Earth Day Network's campaign A Billion Acts of Green.

climate change activism in India needs to focus less on consumption and more on protecting and growing natural resources.

> Climate change activism in India needs to focus less on consumption and more on protecting and growing natural resources.

"There are two basic groups of people in India," Kumar explained. "The poorest of the poor, who are impacted most by climate change, form the majority group. Their real concern above everything else is livelihood. The smaller group of affluent Indians is not immediately impacted by climate change."

Noting that 800 million Indians earn less than $2 a day, Nazeeb Arif, senior executive at ITC Limited, a company that has reduced its **carbon footprint** to zero, observed that "these 800 million are already [struggling to survive], so you cannot ask them to consume less." And Arivudai Nambi, director of the Climate Change Program at the M.S. Swaminathan Foundation, echoed that observation. "There is a difference between survival emissions and luxury emissions," he said.

The consensus from the experts was that there was an immediate need to build natural capital, in particular by expanding India's green space, and to conserve and protect water resources.

Grass-roots Advocacy Yields Groundswell

To raise environmental awareness and encourage sustainable economic growth, Earth Day Network partnered with several nongovernmental organizations to reach citizens at the grass-roots level. The goal was to help people understand the conflict between material sufficiency and environmental impacts of growth, and to help them discover ways to bridge that divide.

Over the past year, Earth Day Network has sponsored several programs that culminated on Earth Day 2011 in some 200 cities and districts across India. Earth Day Network collaborated with local organizations to hold events in urban centers, in second-tier cities, and in village after village of each of the country's major regions.

People came by the hundreds to participate, attracted by the range and creativity of the

Courtesy of Earth Day Network - India

A 2011 rally organized by nongovernmental groups in support of solar lanterns in the Sunderbans, a region in West Bengal.

programs. As Maneesha Sharma, director of an organization that works in tribal areas, pointed out, the community is the lead player in "making transformational change — changing how people live, work and do business." On Earth Day, her organization developed green patches for kitchen gardens, using runoff from public water pumps.

> On Earth Day, Earth Day Network developed green patches for kitchen gardens, using runoff from public water pumps.

In Leh, a mountainous region dotted with Buddhist monasteries that saw massive destruction from flash floods in 2010, community leaders joined a *padayatra*, or foot tour, around villages to explain global warming. Volunteers from Pallishree spent a week with fishermen's communities around Chilka, the largest brackish water lagoon in Asia, sensitizing them to the need to protect the lagoon's fauna and flora. "It will benefit you" was their key message.

In Almora, an area that faced rampant deforestation in the past, women adopted trees; and in Kerala, farmers learned about organic farming. Meanwhile, in northeastern India, an area rich in **biodiversity**, volunteers trekked for miles to small hamlets to explain why greenery is precious and must be saved.

Mobilizing A Young Country

India has a large young population: 72 percent of its citizens are below the age of 40. So it makes sense for Earth Day Network to target this important group.

Innovative programs in hundreds of schools and colleges inspire youth to be *paryavaran mitras*, or friends of the environment. The participation, which is ongoing, has been impressive:

- 40,000 city students are discovering nature by spending time in forest reserves.
- 10,000 tribal children have learned about the usefulness of trees and been involved in tree-planting projects.
- Hundreds have found joy in organized bicycle games.

Together, these children form a strong community of ambassadors for Earth.

Indeed, youth activism around environmental issues is growing in India. Groups such as the IYCN have members who are committed, bold, knowledgeable and expert at social marketing.

IYCN's novel Climate Solutions Road Tours have sent volunteers travelling over thousands of miles in solar-powered electric cars, in vans running on waste vegetable oil and in **biodiesel** trucks, stopping en route to talk about renewable and clean energy. Accompanying them was Solar Punch, a group of young musicians from the United States who use solar power to amplify the sound of their instruments. Nationality aside, these youth are citizens of Earth first as they work together to save their common heritage.

Earth Day Network also supported the Self Employed Women's Association (SEWA), the largest trade union for women, when it conducted events in several districts to promote green livelihoods for women. SEWA volunteers discussed greener methods of farming with women in rural parts of India. They also offered low-interest loans to allow women to shift to clean cookstoves, solar lanterns and other clean technologies.

Courtesy of Earth Day Network - India

At the Bengal Home Industries Association even puppets stand up for nature and Mother Earth.

Several large software companies and consulting firms encouraged their employees to volunteer expertise to develop green technologies. "Typically, large and well-established industries believe in long-term planning," said Surojit Bose, associate director of sustainability and climate change at PricewaterhouseCoopers, a consulting firm. "They are, therefore, well into understanding these [climate change] risks and building … business strategies, and forming partnership models."

Government agencies and members of the private sector and media supported these efforts. India's National Council of Science Museums commemorated Earth Day in all its 24 museums, reaching out to thousands.

The groundswell of activities around Earth Day in India showed organizers how wide and deep the A Billion Acts of Green campaign has gone. Earth Day Network will build on this momentum to ensure that, eventually, every day is Earth Day in India. ■

Karuna A. Singh is country director for Earth Day India. She joined Earth Day Network in 2010. Before, she had spent 24 years at the U.S. Consulate in Kolkata, most recently as a senior executive focusing on environmental affairs.

The opinions expressed in this article do not necessarily reflect the views or policies of the U.S. government.

Local Citizens Must Join Climate Debate

AP Images

Schoolchildren participate in a drive to clean the Yamuna River in New Delhi.

On World Environment Day, June 5, 2011, Latika Nayar and her family huddled in one room of their comfortable New Delhi home. A single fan and light were the only appliances they allowed to run that weekend. It would be their way to reduce their **carbon footprint**, albeit for just two days, Nayar explained to her parents, grandparents and younger sister.

Nobody could send e-mail, watch television, talk on the phone or turn on the air conditioning that weekend with the temperature reaching 41 degrees Celsius. "My mother was a bit irritated — they all think I'm a little rebel — so I gave them all a long lecture on how we're all spoiling the environment," the 22-year-old social worker said.

Nayar spoke with some authority, having received the prestigious Green Globe award in the youth category just a few months earlier. India's film industry established the awards to highlight the climate crisis. A participant in India's 2011 Youth Unite Voluntary Action (YUVA) meet, an event organized by the New Delhi-based The Energy and Resources Institute (TERI), Nayar is part of a growing movement of environmental youth who are starting to make themselves heard across India.

Call For Youth To Act

TERI wants to engage young people from different countries in discussions about climate change and other environmental challenges, and encourage them to take actions that make a difference in their communities, said Aditi Pathak, a TERI research associate. "The youth of today will be the direct brunt bearers of environmental degradation and overconsumption of resources," she said. "Therefore, they need to be actively engaged at the local and national level in dialogues, discussions and deliberation on climate change and sustainability."

The YUVA conference has grown from 148 participants when it was first held in 2009 to 190 in

Courtesy of YUVA

Students at the 2011 YUVA meet in New Delhi work on environmental case studies.

Courtesy Photo

Latika Nayar

2011. Of those, most came from India and the rest hailed from 11 other countries. During the conference held in early February 2011, the students were divided into teams that were each given an environmental problem to solve. Nayar's team tackled a case study in which a large industrial facility had moved into a rural area, forced relocation of some villagers and polluted the local river residents depended on for water and fish. It gave Nayar an opportunity to voice a belief she's passionate about: Environmental problems cannot be dealt with in isolation; they must be addressed in a holistic manner.

Bringing It All Together

Nayar is convinced that environmentalists who focus just on trees, or economists who only think of development, are missing the big picture. To build a sustainable future for people on Earth, she said, we must first understand how our climate, health, economy and social structures all interconnect.

"You cannot force people out of the forest because you want to protect trees," Nayar said, "and you can't expect tribal people to become vegans — fish is their staple." Nations such as India that are lifting millions into the middle class have to find a way to expand their economies in an **environmentally sustainable** way without disrupting the lives of marginalized people, she said.

Nayar's team presented a plan under which the villagers in their case study pushed village authorities to put pressure on central government and got nongovernmental organizations to help. They also worked with the polluting factory because the plant brought jobs and tax revenues to the region. The team learned from their TERI mentors that microbes could be used to break down the chemicals in the river, and that there was technology available to prevent further pollution. "We were trying to show that when in a village you must speak up. If your issues are not mainstreamed you won't be heard," Nayar said.

Their thoughtful presentation landed the students an invitation to the February 3, 2011, Delhi Sustainable Development Summit, a TERI-sponsored global conference at which the Green Globe awards are given out. "It was the best day of my life," Nayar said of receiving her award.

She hopes to eventually earn a doctoral degree that will allow her to address environmental problems from a social perspective, making sure that local communities are part of future green solutions. ■

— Karin Rives

The views expressed in this article do not reflect official TERI policy or that of the U.S. Department of State.

Banking on Wind

Nedbank's commitment to green energy assures its status as Africa's first **carbon-neutral** bank, and helps maintain its well-cultivated environmental reputation.

Courtesy of Nedbank

Courtesy of Nedbank

Kruger Park ranger Jantjie Mphela helps protect endangered ground hornbills as part of a conservation program sponsored by Nedbank.

In late 2010, curious residents of the Dunoon township near Cape Town watched a 15-meter wind turbine being installed next to a new bank in a local strip mall. It's not every day — in South Africa or anywhere else — that your local bank will use wind power to fire up automatic teller machines, computers and lights.

From an energy security point of view, however, it made perfect sense. With supply shortages and rolling blackouts plaguing the overtaxed electric grid, the country's second-largest retail bank is looking to renewable power as it expands its branch network.

Courtesy of Nedbank

The Dunoon branch of Nedbank is partially powered by a wind turbine.

On The Environmental Path

As Nedbank executives explain it, the investment in wind power is just a continuation of a corporate journey that began about 20 years ago.

In 1990, the bank established a partnership with the World Wildlife Fund, an international conservation group, known as The Green Trust, which continues to this day. So far, the trust has raised 100 million rands (about $14 million) for more than 170 wildlife and habitat conservation projects across South Africa.

Then in 2010, Nedbank became the first African bank to

reach **carbon neutrality**, or net zero **greenhouse gas emissions**. It achieved the status by investing heavily in energy efficiency and by purchasing so-called **carbon credits** from a forest protection program in Kenya's Kasigau Wildlife Corridor.

The **carbon credit** program, which helps businesses and individuals offset their greenhouse gas pollution by investing in emissions-reduction projects elsewhere, is managed by a U.S.-based company, Wildlife Works.

"For us, it's important to be able to have our own house in order before taking on a leadership role in the larger African context," said Brigitte Burnett, Nedbank's head of **environmental sustainability**.

"We looked at **carbon neutrality** to make sure that our operations impact the environment as little as possible," she said. "But we also saw it as a great platform to create some leadership and some thinking around how South Africa can play a part in addressing climate change."

"For us, it's important to be able to have our own house in order before taking on a leadership role in the larger African context."

Be Lean, Be Green

The Dunoon branch today gets about 35 percent of its electricity from the wind turbine, but that share may grow to 75 percent once the bank has installed energy-saving lights and more efficient air conditioning units, said Ralph Stuart, Nedbank's head of channel infrastructure. As the bank ramps up investments in renewable energy, it hopes to gradually lessen its reliance on the coal-dependent national grid. But this will require a continued commitment to energy savings.

Over the past three years, Nedbank has trimmed about 36 million rands ($5 million) in operational costs by reducing business travel, installing energy-saving lights and appliances, and cutting back on paper and water consumption.

The bank is also gleaning knowledge from other corporations that invest in green solutions. Stuart, for example, is talking with MTN, a leading South African mobile phone operator that has been combining solar panels with wind turbines at antenna base stations in remote rural areas. This approach may also work for Nedbank's branches in areas with inadequate wind, he said.

The next wind-powered Nedbank branches are expected to open in the province of Port Elizabeth and in another part of the Western Cape. The bank is also looking into retrofitting existing branches and automatic teller machines with wind power or other clean-energy options.

"We pride ourselves on these achievements," Stuart said. "I'm truly proud working for Nedbank." ■

— K.R.

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Sweet Resolution Saves Water

AP Images

A Salvadoran field worker harvests sugar cane.

Joe Rozza remembers the blank stares he received from his Florida secondary-school friends in the early 1980s when he proposed a plan for protecting the state's fragile lakes and streams.

Storm-water runoff? Polluted water?

Much has changed since then. Today, Rozza travels the world on behalf of the Coca-Cola Company to oversee water and wastewater management projects initiated by the Water and Development Alliance (WADA) — a partnership between his employer and the U.S. Agency for International Development (USAID). He is the company's global water resource sustainability manager.

Everywhere he goes these days, people are aware of the issue. Access to clean water has become a growing priority for countries everywhere as populations increase and climate change threatens water supplies. This is particularly true in Central America, which is becoming increasingly vulnerable to climate change-related hurricanes and droughts, according to the United Nations. In 2009, several countries in the region declared a state of emergency because of lingering droughts that threatened crops and freshwater supplies. The likelihood of more frequent and prolonged droughts in the future makes water monitoring and conservation a priority for the region. About 80 percent of Central America's fresh water is consumed by agricultural operations — a percentage that the region cannot afford as droughts make water increasingly scarce.

Partnership For Water Conservation

Water is also important to huge corporations, including Coca-Cola, whose business depends on steady access to clean water and on economically healthy communities that can purchase their products.

"Ultimately, improving **[environmental] sustainability** and economic development opportunities in the developing

world will create business opportunities not only for Coca-Cola Company, but also for many other businesses," said Rozza.

By partnering on water issues, he said, Coca-Cola and USAID have been able to pool their resources and expertise for a better outcome. In El Salvador and Guatemala the alliance is working with sugar refineries and local governments to improve water and wastewater management practices. The $362,000 project, which began in 2009, is similar to other WADA projects undertaken in recent years in Australia, Brazil, China and South Africa.

> Access to clean water has become a growing priority for countries everywhere as populations increase and climate change threatens water supplies.

The partners have hired the non-profit Global Environment & Technology Foundation (GETF) to work with sugar mills in the two countries to make sure they comply with **environmental sustainability** commitments spelled out under a free-trade agreement between the United States, the Dominican Republic and five Central American countries. The plan is to replicate the WADA program in countries covered by the agreement.

Sugar Industry And New Standards

GETF conducts audits of sugar refineries, recommends changes designed to improve their performance and helps managers implement better practices. In many cases, the changes they make — such as installing better machines — immediately help the factories save money on energy and water. That has helped the alliance sell the idea to other companies and to overcome resistance to sometimes expensive capital investments, according to GETF.

By March 2011, four refineries — all of them Coca-Cola suppliers — were part of the program, with more companies expected to join. WADA is pushing the suppliers to measure their performance against voluntary production standards, such as the Bonsucro: Better Sugar Cane Initiative, launched in 2010 to lessen the sugar-cane industry's impact on the environment.

Coca-Cola's Rozza is glad he can leverage the company's brand in the area of corporate responsibility.

"The programs we're involved with, like WADA, are resulting in real change for the better," he said. ■

— K.R.

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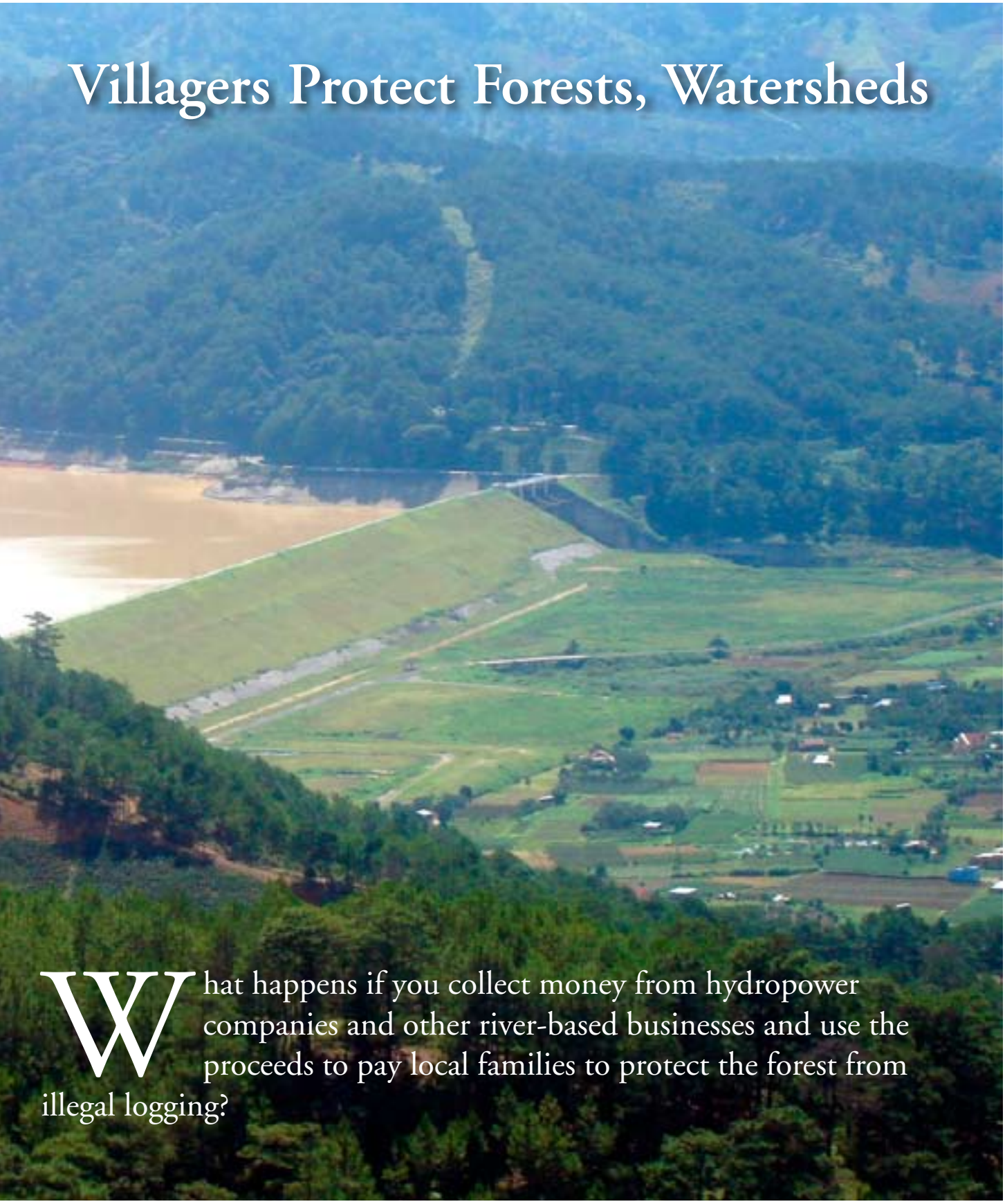
AP Images

Employees of Compania Azucarera Salvadorena harvest sugar cane for the sugar mill in San Julian, El Salvador.

Villagers Protect Forests, Watersheds



What happens if you collect money from hydropower companies and other river-based businesses and use the proceeds to pay local families to protect the forest from illegal logging?

Courtesy of Winrock International

Courtesy of Winrock International

Farmers from K'ho ethnic minority communities form patrols to guard the forest in the Da Nhim watershed.

During a two-year pilot project in Vietnam's Lam Dong province, the U.S. Agency for International Development (USAID) and its contractor Winrock International, a non-profit development group, worked with power producers, tourism businesses, the Vietnamese government and local residents to put such a scheme in place. The result: Illegal logging in the province dropped by half between 2008 and 2010. Similar projects have been successful in the United States and Costa Rica.

Enlisting Local People

The program in Vietnam enlisted nearly 8,000 households, awarding each an average of about 11 million Vietnamese dong (about $537) annually in return for their members regularly patrolling and monitoring a section of the forest. The effectiveness of such a grass-roots effort — the first pilot of its kind in Southeast Asia — made headlines and prompted Vietnam's prime minister, Nguyen Tan Dung, to issue a national decree making the Payment for Forest Environmental Services (PFES) program permanent.

The program helps protect **biodiversity** and sustain communities and businesses in the sensitive Mekong River basin. By protecting trees, the PFES scheme also helps reduce carbon dioxide emissions that are released when logging occurs.

"It's crucial to enlist people locally," said Barry Flaming, a program development specialist who focuses on **biodiversity** at USAID's Asia office in Bangkok. "They are the stewards of local forests and watersheds and are the ones that reap the benefit and costs of [these] activities. Local action can be very effective in projects such as this, but only if sufficient incentives exist and there is appropriate political support for local participation."

Corbis Images

A young K'ho woman legally collects firewood. Does her family help fight illegal logging?

Courtesy of Winrock International

Villagers read a billboard explaining the benefits of keeping the local ecosystem intact.

Logging in Southeast Asia — some of it legal and much of it not — is a big contributor to global **greenhouse gas emissions**. The logging occurs to make room for agriculture that feeds growing populations, or to accommodate economic growth. Sometimes trees are cut for lumber profits. The results of either practice can be devastating.

Trees absorb and store significant amounts of carbon dioxide that is released when they're cut. The degradation of the forest also leads to erosion and build-up of silt in waterway. This can have a negative effect on hydropower plants downstream. When forests are cut and landscapes destroyed, wildlife habitats and tourism suffer as well.

Nearly 17 percent of worldwide carbon dioxide emissions, the lead cause of climate change, come from deforestation, according to the U.N. Food and Agriculture Organization. Roughly half of those emissions come from tropical Southeast Asian nations, with Indonesia leading the pack.

In a January 2011 study, Winrock International reported that the Vietnamese PFES program, if continued successfully, could prevent the loss of 14,000 hectares of forest between 2010 and 2037, and prevent more than 8 million tons of carbon dioxide emissions from being released into the atmosphere.

Education And Incentives

The organization helped Lam Dong Province establish Vietnam's first provincial forest protection and development fund and create a mechanism for collecting money from hydropower and water companies and 59 tourism concessions.

The group also conducted a broad education campaign to engage people on the ground — the farmers and local residents on whom the program's success would depend.

Twenty-four poster panels, 200 small billboards and 42 large roadside billboards were erected to teach people about the value of **biodiversity** and the role trees play in the ecosystem. The organization also distributed more than 14,000 brochures and helped Vietnam's Ministry of Agriculture and Rural Development develop a 30-minute video about the PFES program that aired nationally.

Local families learned how they could benefit financially from teaming up with neighbors and regularly patrolling a section of the forest. Participation grew quickly, with 3,500 households joining in 2009 and another 4,500 the following year.

The Lam Dong forest teams also are charged with referring violations to local forest boards and maintaining dossiers that form the basis for the payments from participating businesses.

The carefully crafted program has become a model for other Vietnamese provinces and surrounding nations, according to Winrock International. However, for the program to have a real and lasting impact on illegal logging, the organization said, law enforcement in the region must be better coordinated to ensure that arrests are made and offenders are fined in a consistent manner. ■

— K.R.

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Courtesy of Winrock International

Villagers are trained to monitor water in the Da Nhim watershed.

Green Building Program Takes Off in the West Bank

Courtesy of USAID

Green building design and technology have cut by more than half, compared to a regular structure, water and energy costs of the 580-square-meter Safeer Center.

Six months after the Safeer Center opened in the West Bank, several of the 3,000 children, who regularly attend after-school activities at the Center, gave the two-story facility rave reviews.

"This is the first time that I've seen an environmentally friendly building. In fact, it's also a child-friendly building!" said 14-year-old Sondus Hajeer, who enjoys the Center's modern style and bright colors.

Studying A Green Structure

Jameel Aqra, like Hajeer, a resident of the Askar refugee camp in the West Bank, began volunteering for the Safeer Center as a 10-year-old when the facility was housed in a rented building in Nablus. He has studied the new building's efficient insulation layers, which are visible through a cut-out in the wall. He also has taken an interest in the Center's rainwater collection system and window shadings that reduce air conditioning costs.

"The idea of a green building was new for me and a first for our camp. I really like the new building," said Aqra. He was so inspired by the concept that he decided to study engineering with a specialty in environmentally friendly buildings.

The Safeer Center, owned and operated by the non-profit Palestinian Child Care Society, moved into the new

building in December 2010. It is a better and healthier facility for the many children that attend the Center's educational programs.

The construction of the Center was funded by the U.S. government through the U.S. Agency for International Development (USAID). Over the next five years, USAID plans to support the construction of several more green buildings, which will serve as models in resource-challenged West Bank and the Gaza Strip.

These buildings will be constructed as part of an ambitious U.S. government-funded $100-million program to improve living conditions and spur **environmentally** and socially **sustainable** infrastructure projects throughout the Palestinian territories. Through this program, USAID is also sponsoring a green engineering fellows initiative for recent university graduates, conducting workshops for local Palestinian government officials and industry representatives, and supporting public outreach on energy conservation and other environmental issues.

First on the to-do list is a new community center in the northern West Bank, followed by a green school that aims to become the first LEED-certified building in the area, and one of the first in the Arab world. LEED stands for Leadership in Energy and Environmental Design. It is a coveted, internationally recognized green-building certification standard, which provides third-party verification that a building was designed and built using methods intended to improve energy savings, water efficiency, carbon dioxide emissions reduction, indoor environmental quality, and stewardship of resources.

Courtesy of USAID

Some 3,000 children from the old and new Askar refugee camps in Nablus use the Safeer pre-school education center.

What's In It For Us?

Just like people anywhere else in the world, Palestinians initially had some misconceptions about green buildings, said Kari Jorgensen Diener, a green building specialist at CHF International, USAID partner in its community infrastructure development program. "The big challenge has been concern about cost and getting people past that," she said. "People tell us, 'We have a limited budget and we don't want to do something too fancy, or to get technology we can't maintain.' So working with them, we try to emphasize that a green building doesn't necessarily mean expensive technology. It can be something as simple as which direction a building faces or sun shading."

Once local leaders realize that green design features will save their communities money in the long run, resistance begins to fade, she said. In fact, the Safeer Center's electricity costs were cut in half and water usage reduced by two-thirds during its first six months of operation. This has freed money for computers, additional programs, new staff and other pressing needs.

Such benefits, along with a recognition that green buildings, made from mostly local materials, lead to more local jobs and healthier communities, are generating enthusiasm for **environmentally sustainable** construction in the region, Diener said. So is the idea of going back to some of the smart building designs that were perfected in the Middle East generations ago, such as courtyards that offer natural ventilation during hot summer days.

Energy costs in the Gaza Strip and the West Bank tend to be twice as high as in surrounding countries because all electricity and fuel is imported. This has made people in the region eager to save when they can.

"People quickly realize that green buildings translate into a lot of benefits for them," Diener said. ■

— K.R.

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Students Battle for Innovative Energy Solutions

Courtesy of Zero Fotografie

Members of an international team work on a plan for eliminating all carbon dioxide emissions from space travel.

They met in a large industrial conference hall in the Dutch seaport of Rotterdam to seek answers to some of the world's most vexing energy problems: around 100 university students representing different disciplines and countries competed driven by a desire to find solutions.

The second preliminary round of the International NRG Battle, an industry-sponsored competition featuring 15 teams, took place in early June 2011. The students had one day to come up with proposals for such challenges as making the Dutch power grid capable of accommodating 10 million electric cars, cutting to zero carbon dioxide emissions from spaceships, replacing nuclear power with natural gas, and using social media to get households to save energy.

These and other challenges were presented to contestants by businesses that sponsor the competition, including some of Europe's leading energy companies. These companies, which are racing to reduce **greenhouse gas emissions** and develop renewable energy sources to meet obligations under the Kyoto Protocol, are looking for innovative solutions. The Kyoto Protocol is the UN scheme designed to halt climate change.

Everybody Wins

Students from different parts of the world apply online to participate in the competition and are selected based on their interest and expertise. The brightest and most promising candidates are then invited to join a "battle" team that crafts and presents a three-minute pitch to a jury of company executives on the day of the event.

"The benefits for the students are the network[ing] possibilities, the opportunities to get an internship, or even a better job, and acquire hands-on experience in the field they're interested in," said Jan Schulte, spokesman for StudentStock, the Netherlands-based organization sponsoring the NRG Battle.

"Companies join because of the fresh and innovative perspectives that students bring to the cases … and 'the battle' is an excellent opportunity to recruit talent," he said. "Our ambition is to become a global talent hub for innovative ideas through the collaboration of students and universities, companies and the national governments. We believe that if we work together with all parties involved on sustainable and innovative solutions, we will be able to live in a greener world."

Ismaêl Drenth, a 24-year-old student who specializes in international power generation and distribution at the Hanze University of Applied Sciences in the Netherlands, said he wants to dedicate his career to **smart grids** — technology that makes power systems more efficient and helps consumers save energy.

Participating in the NRG Battle for the second year in a row, he found himself on a strong team in the Rotterdam semifinal.

A Solution For The Future

Siemens, the large German technology company, had asked Drenth's team whether Dutch power demand could be met with a mix of offshore wind power and natural gas by 2050. Siemens specified the solution also would need to accommodate a surge in the number of electric cars and allow such vehicles to temporarily store electricity and feed it back to the grid. This emerging technology, known as electromobility, is of interest to power operators that must plan for electricity supply and demand peaks.

The solution, Drenth and his team concluded, is a sophisticated, computer-driven **smart grid** that helps solve the problem of energy storage, in part by taking advantage of the power in the batteries of electric cars and by having gas-fired power plants serve as backups when production from wind stations goes down. This, in turn, would give investors in off shore wind power some assurance and make a massive ramp-up of the clean energy source economically feasible, the team argued.

Drenth's team won and advanced to the third and final round of the competition to be held in October 2011.

He hopes he will one day use his passion for cutting-edge technology to make the world a better place. "My career plans are not yet fully crystallized," he said. "But one thing is for sure: I want to develop the energy area to make sure all things are in balance." ■

— K.R.

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Courtesy of Zero Fotografie

Ismaêl Drenth, first from left, and his fellow team members celebrate their victory together with leaders from industry and the city of Groningen.

Local Governments Take the Lead on Climate

Tommy Linstroth and Ryan Bell

AP Images

Portland, Oregon, pioneered smart urban growth policies in the United States. The city's extensive transit network includes a streetcar.

These are excerpts from Local Action: The New Paradigm in Climate Change Policy *by Tommy Linstroth and Ryan Bell, University of Vermont Press, 2007. The headline and sub-headlines were added by eJournal editors.*

In spite of the barriers [such as making a global issue local and funding], local governments can be ideal places to address global warming for three related reasons. First, local governments adopt their own distinctive policies, appropriate for unique local circumstances. Local governments control many of the factors related to **greenhouse gas emissions**, such as energy codes, land-use decisions, residential and commercial regulations, transit options, and solid waste disposal. Second, local authorities can encourage action by others in response to climate change, by lobbying the national government and by demonstrating the best-practices costs and benefits of controlling **greenhouse gas emissions**. Finally, municipalities have considerable experience addressing local environmental impacts within the fields of energy and waste management, transportation, and planning and development.

City as Policy Lab

Additionally, actions taken locally are a form of bottom-up environmental protection and resource conservation, and can act as microcosms for potential national policies. Demonstrations of the effectiveness of mitigation options at the local level could make it more feasible for higher levels of government to adopt similar policies, and could make international actions more attractive. Research has indicated that there is a history of local governments demonstrating the effectiveness of policies, which are then adopted at higher levels of government.

AP Images

The Sonnenschiff (Sun Ship) solar-based complex in Freiburg, Germany, produces four times the energy it consumes.

Local governments have a variety of opportunities to influence the emissions being released from their communities. Although the government is limited in its ability to take direct action to reduce emissions from the private sector, it can use policies, incentives and investments to encourage emission reductions. By taking a leadership role in setting the framework for greenhouse gas reduction programs, local governments can see an

increased participation level from all sectors and thereby realize a higher success rate in meeting their emission reduction goals.

[…]Local governments have a great advantage over larger management units in that they tend to be smaller, less bureaucratic, and more flexible than national, international or even state institutions. They are closer to their constituencies and can monitor directly the effects of policies and actions that are put into place and therefore adjust more readily to changing situations. Local governments can experiment more readily with innovative policies. Other communities can adopt the programs that prove successful, and if an approach does not have the desired impact, changes can be made without the entire country having to change course midstream. Thus, the local level is the ideal level at which to tackle **greenhouse gas emissions** reductions.

Lessons Learned

The experiences of the early adopters — the local governments that have been striving to address global warming since the late 1980s — have helped to illustrate some key features that can ensure the success of local climate change programs. To develop a truly successful program, it is important that a local government:

> Actions taken locally … can act as microcosms for potential national policies.

• Have a tangible goal against which progress can be measured. Too often, policies are set with vague objectives, which leads them either to be overlooked or without a mechanism to measure success.
• Develop a formal action plan with specific actions, responsibilities, and performance criteria laid out in it. Building a coordinated effort in which actions and policies support one another greatly improves the chances for success over implementing a collection of actions that are unrelated.
• Tie emissions reductions to other local goals and objectives. […] Climate protection can address communities' public health, economic, and quality of life objectives. Tying emissions reductions to these efforts and integrating them into larger municipal plans will help ensure longevity in the face of limited resources and competing priorities.
• Involve the public and various sectors throughout the process. Ultimately, it is the public that will have to implement most of the policies that are adopted. Therefore, involving affected sectors from the outset, so that they view themselves as stakeholders, will improve the chances for a program's success.

Courtesy of Tim Tay

Fort Collins, Colorado, supports electric vehicles, including electric scooters.

• Form partnerships within and among communities. The greater number of resources, skills, and points of view that are brought to the table, the better. It is quite likely that other local programs can support emissions reductions. Facilitate systems where different entities can contribute in their areas of expertise.
• Monitor actively the outcomes and results. No matter how well programs are planned ahead of time, unexpected outcomes can occur. The implementing agency should be aware of the direct and collateral impacts that its programs have.

Most importantly, local jurisdictions must be flexible and willing to innovate. If a monitoring regime shows that a program is not having the desired outcome, the local government should have the flexibility to adjust. Additionally, because climate change is a larger problem than local communities regularly tackle, solutions often will require "outside of the box thinking." Local governments should be open to innovations rather than adhering to business-as-usual policies. ■

Tommy Linstroth is founder of Trident Sustainable Group, a consulting firm. Ryan Bell is sustainability project manager at County of Alameda, California.

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Glossary

Biodiesel — A fuel made from a vegetable oil or animal fat that can be used in standard diesel engines as a low-carbon alternative to regular diesel fuel.

Biodiversity — The variety of life and its processes that includes the diversity of living organisms, the genetic differences among them and the communities and ecosystems in which they occur.

Cap-and-trade market — The central part of the emission trading mechanism. Under this mechanism, an authority sets a limit or cap on emissions of a pollutant and allows entities that exceed the limit to buy emission credits from those whose emissions fall below the limit. (*See carbon credit.*)

Carbon credit — A permit that allows a country or organization to produce a certain amount of carbon (greenhouse gas) emissions. The permits can be traded. *(See cap-and-trade market.)*

Carbon footprint — The amount of greenhouse gases emitted as a result of the consumption of fossil fuels by a person, group, business or country.

(Carbon) fuel standard — A rule designed to reduce carbon content of transportation fuels. The most common low-carbon fuels are natural gas, ethanol and biodiesel.

Carbon neutrality — Net zero carbon (greenhouse gas) emissions achieved by balancing an amount of carbon in emissions released into the atmosphere with an equivalent amount of carbon in sequestered or offset emissions, or carbon credits (or a mixture of both measures).

Carbon trading — A system of trade related to schemes designed to limit carbon (greenhouse gas) emissions. *(See cap-and-trade market.)*

Environmental sustainability — The capacity to meet the needs of the current generation without compromising ecosystems and environments essential to future generations' ability to meet their own needs.

Greenhouse gas emissions — Emissions of mostly carbon gases produced by human activity and natural processes that trap the heat in the atmosphere, thereby causing global warming. Carbon dioxide and methane are primary greenhouse gases.

Housing (urban, development) density — The number of people who live in an urbanized area. Higher densities are associated with benefits such as more efficient use of transportation and infrastructure, such as water and sewage systems.

Smart grid — An electricity grid configured as a network of providers, delivery systems and customers that allows for interactions between the utility and its customers. Such a grid uses digital technology to save energy, reduce cost and increase reliability and transparency of supply.

Smart land use — A public policy that seeks to make the use of land efficient and environmentally friendly. It is part of environmentally sensitive land development designed to minimize dependence on auto transportation, reduce air pollution and make infrastructure investments more efficient.

Renewable portfolio standards — A regulation that requires utilities and other electricity providers to generate a specific portion of their supplies from eligible renewable energy sources, such as wind, solar and geothermal.

Additional Resources

More Information About Grass-roots Climate Actions

C40 Large Cities — Climate Leadership Group, a network of the world's largest municipalities committed to sharing information and working together, supported by the Clinton Climate Initiative.
http://www.c40cities.org/

Carbon*n* Cities Climate Registry, an online service that helps cities and local governments to measure, report and verify their measures to reduce greenhouse gas emissions.
http://carbonn.org/carbonn-cities-climate-registry/

Climate Protection Center, U.S. Conference of Mayors' information center on best practices, grants and events related to the 2005 U.S. Conference of Mayors Climate Protection Agreement.
http://www.usmayors.org/climateprotection/about.htm

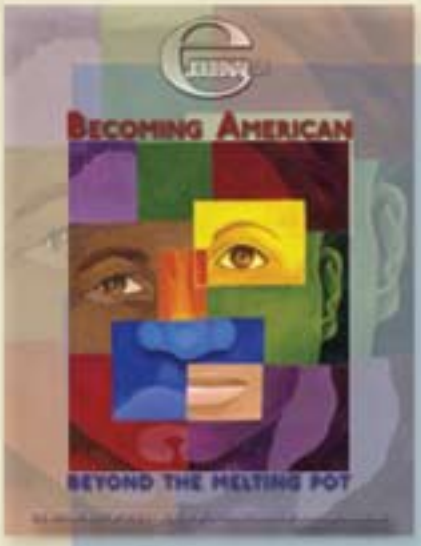
Earth Day Network, a nongovernmental group devoted to educating youth and the general public around the world about environmental issues.
http://www.earthday.org/

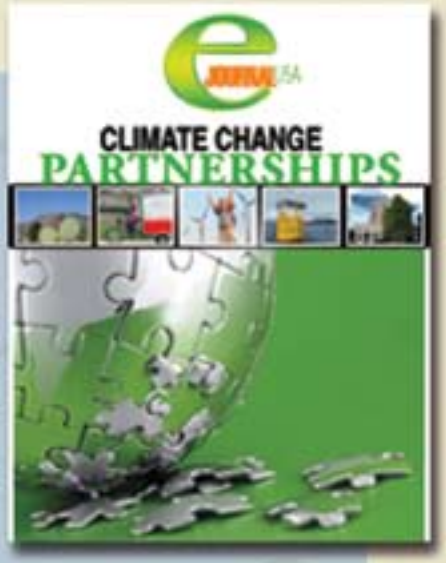
ICLEI — Local Governments for Sustainability, an association of more than 1,220 local governments from 70 countries that are committed to environmentally sustainable development.
http://www.iclei.org/

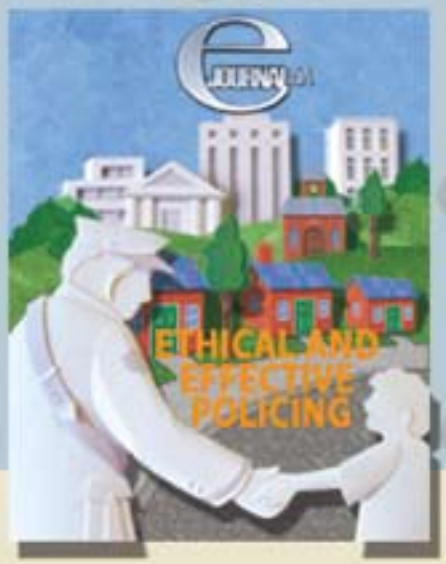
International NRG Battle, an industry-sponsored international student competition for solutions to energy and climate problems.
http://www.nrgbattle.nl/home.php

Regions of Climate Action (R20), an international nongovernmental group that works on low-carbon and climate-resilient projects through cooperation among local governments and other parties.
http://www.regions20.org/

World Mayors Council on Climate Change, an alliance of over 50 local government leaders advocating their involvement in efforts addressing climate change and related issues.
http://www.worldmayorscouncil.org/







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