

Double Jeopardy

What the Climate Crisis
Means for the Poor

Brookings Blum Roundtable 2008

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The Global Economy and Development Program at the Brookings Institution examines the opportunities and challenges presented by globalization, and it recommends solutions to help shape the policy debate. Recognizing that the forces of globalization transcend disciplinary boundaries, the program draws on scholars from the fields of economics, development, and political science, building on Brookings' worldwide reputation for high-quality, independent research. Experts focus their research, analysis, and policy innovation in three key areas: the road out of poverty, the drivers shaping the global economy, and the rise of new economic powers.

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Realizing Rights: The Ethical Globalization Initiative, a project led by Mary Robinson, the former president of Ireland and United Nations high commissioner for human rights, brings key stakeholders together in new alliances to integrate concepts of human rights, gender sensitivity, and enhanced accountability into efforts to address global challenges and governance shortcomings.



Noble Nobels: Solutions to Save the Planet: (from left to right) Walter Isaacson (Aspen Institute), Steven Chu (Lawrence Berkeley National Laboratory), Al Gore (Alliance for Climate Protection)

Foreword

From August 1 to 3, 2008, more than fifty preeminent policymakers, practitioners, and thought leaders from around the world convened at the Aspen Institute to explore the links between global climate change and poverty alleviation. Starting from the premise that climate solutions must empower the poor by improving livelihoods, health, and well-being, and that poverty alleviation itself must become a central strategy for both mitigating greenhouse gas emissions and reducing vulnerability to the adverse effects of climate change, the roundtable sought to shape a common agenda to tackle two of the greatest challenges of our time.

The roundtable was hosted by Richard C. Blum and the Brookings Institution's Global Economy and Development Program, with the support of honorary co-chairs Walter Isaacson of the Aspen Institute and Mary Robinson of Realizing Rights: The Ethical Globalization Initiative. Previous roundtables have focused on America's role in the fight against global poverty (2004); the private sector's role in international development (2005); poverty, insecurity, and conflict (2006); and international development's changing landscape (2007). Reports from those expert gatherings are available at <http://www.brookings.edu/global/Brookings-Blum-Roundtable.aspx>.

Roundtable participants offered a wide range of individual and institutional expertise, as global policy negotiators, technologists, financial leaders, social entrepreneurs, health and humanitarian experts, and climate science pioneers. Rather than summarizing the conference proceedings, this essay—like those from previous years—attempts to weave together the informed exchanges, varied perspectives, fresh insights, and innovative proposals that emerged during the three-day discussion. A companion volume—*Climate Change and Global Poverty: A Billion Lives in the Balance?* (Brookings Institution Press, forthcoming)—contains chapters by experts that provide in-depth analysis of the topics addressed in Aspen.

Acknowledgments

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Dual Challenges



As the twenty-first century unfolds, humanity faces two defining challenges: lifting the lives of the global poor and stabilizing the Earth's climate. Our success or failure in meeting these challenges will shape the future for our children and successive generations, for many choices we make today will drive consequences for years to come.

Around the world, extreme poverty fuels a volatile mix of desperation and instability—exhausting governing institutions, depleting resources, weakening leaders, and crushing hope. Conscience demands that we confront the facts—10 million children under five years old still perish each year of largely preventable causes; more than 850 million people are hungry; and, in an era of dazzling medical accomplishment, a woman still dies in childbirth each minute. Global security also demands that the fight against global poverty become a fight of necessity, for in this age of blurring borders and interdependence, human suffering anywhere poses risks to stability everywhere.

Taking action to reverse climate change is no less urgent an imperative. The planet is warming at an alarming rate, primarily as a result of fossil fuel use, deforestation, and other human activity; left unchecked, the thermometer could rise by 6°C this century—a variation as great as the mean temperature change between ice ages and warm interglacial periods. Eleven of the past thirteen

years have been the warmest ever recorded. Adverse impacts are already apparent in extreme weather, melting glaciers, and altered ecosystems, exacerbating human suffering from the Irrawaddy Delta to Darfur.

Swift, substantial reductions in greenhouse gas emissions are essential to stabilize the climate—a daunting task that will require the transformation of economic and energy paradigms worldwide. But because these gases warm the planet for many years after they are emitted, the emissions legacy of prior years and the unavoidable emissions of tomorrow mean that additional climate change is certain. Thus, while preventing the risk of a future climate catastrophe means cutting emissions immediately, we have passed the point of preventing the consequences of climate change in the decades ahead. The challenge now is to avoid the unmanageable and manage the unavoidable.

Independent Agendas for Poverty and Climate Change

It has been twenty-two years since Gro Harlem Brundtland's report *Our Common Future* put the concept of sustainable development on the map. Yet, for most of the past two decades, the poverty and climate change agendas have proceeded independently. Development experts have viewed climate change as marginally relevant to their



Photo by Alex Irvin

“The global development and climate change communities must do more than learn from each other; they must work with each other to succeed—or risk failure apart. For choices surrounding climate will greatly determine the fate of the poor, just as choices on the path out of poverty will greatly influence the fate of the climate. Increasingly, climate and development are two sides of the same coin.”

— Lael Brainard
Vice President and Director,
Brookings Global Economy and Development



“If they work together, the development and climate change communities can be part of a network of networks—with a diversity of individual perspectives and institutional competences. This kind of leveraging of knowledge and influence will help achieve progress on both fronts.”

— Strobe Talbott
President, Brookings

efforts to raise the living standards of the approximately 1.4 billion people in the developing world who exist on less than \$1.25 a day (in 2005 purchasing power parity). Climate experts have focused primarily on mitigating greenhouse gas emissions in developed countries rather than on bolstering climate resilience or encouraging sustainable development; some have worried that promoting adaptation to climate change would suggest that the battle was already lost, while others have felt that devoting attention to adaptation would detract from the existential imperative of halting climate change itself.

Even governments have failed to make the obvious connection: Neither the Millennium Development Goals nor the official indicators of progress toward these goals mention climate change, and global development has been secondary in the Kyoto Protocol. A Nobel Prize-winning scientific advisory body, the Intergovernmental Panel on Climate Change (IPCC), has raised public awareness about the reality and effects of climate change, but it has had less success in mobilizing action for sustainable development solutions.

Meanwhile, the policy and funding priorities of the climate change community and the development community have been at odds for years. Many climate experts have feared the environmental consequences of the development community's quest to raise living standards with the attendant demands for energy. Indeed, in China, while eco-

nom ic growth has lifted millions out of poverty over the past thirty years, a new coal-fired plant or two is coming online almost every week—a major reason for the developing world's projected doubling of carbon dioxide emissions by 2030, as compared with 2005. The increase in China's annual emissions alone during the next few years will be greater than the current emissions produced by either Great Britain or Germany;¹ already, the emissions of China's electric power sector have surpassed those of the United States (though on a per capita basis, U.S. power-sector emissions are still far greater).²

At the same time, many development experts see actions aimed at stabilizing the climate as negatively affecting the poor. For example, the recent push to grow crops that can be used to make biofuels contributed to the surge in food prices that forced 50 million people into hunger in 2007. And some development advocates worry that the financial strain of responding to the climate crisis will “hijack” official development assistance—noting that emergency aid already accounted for roughly 8.5 percent of bilateral donor disbursements in 2007, as disaster relief diverted assistance from traditional development programs.

Converging Interests

Upon deeper examination, the interests of the climate change and development communities converge more than they conflict. Though global



“...in this age of blurring borders and interdependence, human suffering anywhere poses risks to stability everywhere.”



Photo by Alex Irvin

“We must adopt a narrative of human solidarity in the fight against global climate change. All 6 billion of us have a carbon footprint by virtue of what we eat, how we move around, and how we live. Though this carbon footprint varies enormously by individual, we’re all emitters to some degree or other. We are all part of the problem, and critically, we’re all part of the global solution. Of course those of us who have a relatively higher carbon footprint have a greater responsibility to act first.”

– Saleemul Huq

Director, Climate Change Group, International Institute for Environment and Development

“How do we realize and align the passions of both the climate change and the development communities? For at their core, climate change adaptation and development initiatives are addressing the same issues. We must forge an inclusive framework and vocabulary that dispels false dichotomies and firmly integrates both communities into the other.”

– Nancy Lindborg

President, Mercy Corps

climate negotiations properly seek to assign the greatest responsibility to those nations that have both contributed most historically and are most capable of implementing large-scale solutions, there can be no sustainable long-term solution to climate change without the full participation of today’s poor countries. Though developed countries have been responsible for the bulk of industrial emissions thus far, developing nations now emit roughly half of greenhouse gases worldwide and are expected to account for most emissions growth in the years ahead.

From a climate change perspective, *how* these nations grow will be decisive—that is, whether they pursue the same unsustainable, carbon-intensive path that led to the industrial world’s prosperity or adopt new, clean technologies that fuel nonpolluting growth. But *whether* they grow will also be critical in determining the world’s ability to confront the climate crisis—for as difficult as the challenge is, its burden will be magnified if developing countries are too poor to invest in protecting their own people.

In turn, the fate of the Earth’s climate has enormous implications for the lives of the poorest people. Already, the world is struggling to meet the Millennium Development Goals (MDGs)—the human development targets agreed on by 189 world leaders in 2000. Today, for example, while the world as a whole may succeed in meeting MDG 1—halving the proportion of people living on less than \$1 a day by 2015—at least 47 countries

monitored by the World Bank are seriously off track; and in Sub-Saharan Africa, Western Asia, and Southern Asia, there are more undernourished people today than there were in 1990. Meanwhile, no Sub-Saharan African country is on track to meet MDG 2, which pledges to cut child mortality by two-thirds by 2015; tragically, in 12 countries, child mortality has actually gone up since 1990.³

It is also disturbing that the hard-fought progress in human development achieved so far may be retarded or even reversed by climate change—as new threats emerge to water and food security, agricultural production and access, and nutrition and public health. What is in store for the poor will depend in part on how much mitigation is secured in the coming years—but we already know that such climate effects as sea-level rise, droughts, heat waves, floods, and rainfall variation could, by the 2080s, push another 600 million people into acute malnutrition, increase the number of people facing water scarcity by 1.8 billion, and increase those facing coastal flooding by many millions.⁴

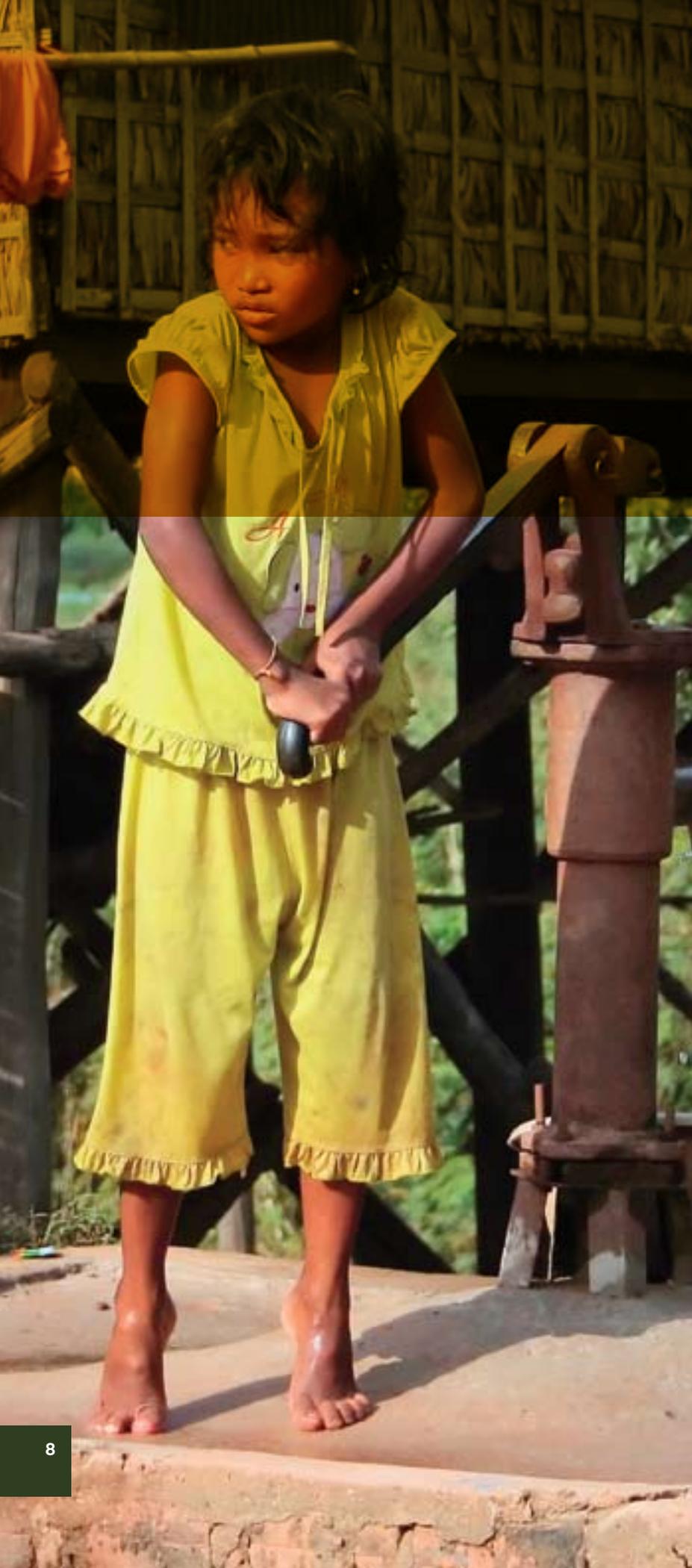
Africa, by virtue of its size, population, and poverty, may prove to be ground zero in a warming world. According to the IPCC’s Fourth Assessment Report, in some African countries, agricultural yields could drop as much as 50 percent by 2020—further impoverishing small-scale farmers and jeopardizing the continent’s food security. Already, roughly a quarter of Africa’s population is under high-water stress; by 2020, the population at risk is projected to be 75 to 250 million people.



Figure 1. Climate Change Impacts



Source: Figures compiled from the IPCC's Fourth Assessment Report.



By the 2080s, Africa's arid and semi-arid terrain may expand by 5 to 8 percent, and its wheat production may cease entirely. Sea-level rise will imperil coastal areas. Malaria will spread.⁵

Yet wherever they live, the poor are especially vulnerable to climate shocks because they have such meager resources to fall back on. When faced with rising prices of food or fuel, the wealthy can cope by curbing consumption or dipping into savings. But for the poorest families, which spend 50 to 80 percent of their income just to get enough food to survive, rising prices force life-altering choices like pulling children out of school or selling precious livestock—choices that tighten the shackles of poverty beyond any chance of escape. Similarly, the wealthy can avoid encroaching threats to their physical safety by investing in protective infrastructure or by moving to another location. But the global poor lack the resources to adapt or retreat—and the citizens of the world's fifty-one small developing island states have literally nowhere to go.

Human Survival, Human Solidarity

Choices about the Earth's climate thus will have an enormous impact on the poor, and choices determining the path out of poverty will greatly influence the fate of the climate. Against this backdrop, climate experts and development advocates increasingly agree that either they must work together or risk failing separately.



Photo by Alex Irvin

“Climate change impacts will directly affect progress toward achieving the Millennium Development Goals. Worse, some climate change mitigation efforts could themselves adversely affect progress toward the goals. Biofuels are a very good example. To avoid making these trade-offs, any targets negotiated in Copenhagen should be integrated into the goals ensuring greater alignment between these two communities.”

– Janos Pasztor
Director, Secretary-General's Climate Change Support Team, United Nations

The initial seeds of collaboration have been planted and are taking root. International humanitarian nongovernmental organizations (NGOs) like Mercy Corps and Oxfam are incorporating climate concerns into their development programs. Environmental organizations, including Conservation International and the World Wildlife Fund, are striving more than ever to ensure that their conservation and climate protection programs create sustainable livelihoods for local communities. But more work remains to align the anti-poverty and climate agendas in mutually reinforcing ways. So far, most developing nations and donor institutions, whether bilateral or multilateral, have failed to truly integrate sensitivity to climate change into their primary operations.⁶ And though encouraging climate resilience, or adaptation, is a prominent topic in the climate negotiations due to conclude at the UN Climate Change Conference in Copenhagen at the end of 2009, “overall, progress on integrating adaptation in development is still more aspirational than operational,” as Shardul Agrawala and Florence Crick of the Organization for Economic Cooperation and Development (OECD) have aptly observed.⁷

In fostering a closer partnership between the climate change and development communities, one place to start is by emphasizing the similarities in the two communities' struggles—their shared sense of urgency, passion, and commitment; their need to build political support both at home and on the global stage; their recognition

that solutions must come from every sector of society; and their understanding that national security and global stability are both at stake. But perhaps most compelling, the climate change and development communities are both fighting for human survival—for a world where people's well-being is assured, and where people ensure the world's well-being.

Climate concerns add a whole new dimension to the mission of human development, for unless we cease fraying what Al Gore calls “the web of life on which we depend,” we will imperil civilization itself. At the same time, the humanitarian community brings heart to the climate challenge, reminding the world that the climate crisis is not an abstract scientific dilemma but a burden that will exact the cruelest toll from those who have done the least to create it. An inclusive framework for cooperation might therefore be one of *survival* and *solidarity*—recognizing not only our obligation to protect our common planet, but also our need to look out for one another, wherever our homes may be.



A Common Agenda



Within this framework, how might we begin to conceive of an integrated agenda for the climate change and development communities? Visually, one might imagine a diagram with three circles—one each for the mitigation, adaptation, and development endeavors—with the focus on where the three circles intersect (see figure 2). An alternative concept, proposed by the World Resources Institute (WRI), is a continuum of adaptation activities—ranging from those geared primarily toward reducing vulnerability in general, which would thus be valuable for development even without the threat of climate change, to those explicitly targeting the effects of climate change, which would not likely be undertaken without it.

Both these models illustrate that some adaptation measures are highly climate-specific—building seawalls, for example, or preventing the bleaching of coral reefs. As the WRI explains, activities like these “tend to require new approaches that fall outside of the relatively well-understood set of practices that we might think of as a development ‘comfort zone.’”⁸ Likewise, some mitigation efforts fall outside the realm of development practices, and vice versa. Indeed, sometimes mitigation and development goals might seem to conflict.

But at the same time, the two models bring into focus significant areas of overlapping interests. They show that in many instances the best form of adaptation is mitigation, and also that

adaptation and development objectives are frequently the same—things like better public health systems, more productive agriculture, and stronger resilience in the face of natural disaster. Indeed, as the WRI experts Manish Bapna and Heather McGray have argued, focusing exclusively on how climate adaptation creates *new* needs may be counterproductive: “Adaptation is not just additional to development but often *is* development.”⁹ Frequently, climate change adds additional urgency to the development agenda without altering its fundamental direction.

This complex situation requires metrics that will capture the full benefits of addressing these common objectives, and thereby mobilize the resources and political will to pursue double and triple wins. Yet the accounting is still flawed. First, the world lacks established means for valuing environmental assets—things like the standing forests, unspoiled rivers, biodiversity, and ecosystem services on which humankind’s well-being depends. All these assets have important livelihood, health, and sustenance benefits for the poor, yet their development benefits are rarely calculated. At the same time, traditional measures of economic growth fail to fully capture the costs of environmental degradation. Improving ways to analyze costs and benefits is a prerequisite for wise decision-making. Developing nations are understandably preoccupied with raising their people’s living standards, and they are unlikely



Photo by Alex Irvin

“The Chinese word for crisis means both danger and opportunity. It’s fitting, then, that the climate crisis poses a formidable challenge to our survival and offers a defining moment in history to promote international cooperation.”

— Xueman Wang
Senior Counsel on Carbon Finance, World Bank



Photo by Alex Irvin

“At present, imperfect policies and uncoordinated priorities are leading to schizophrenic outcomes in the forestry sector. In south and southeastern Brazil, we see huge efforts to plant seedlings in the same areas where the last remnants of the Atlantic Forest are being destroyed. Time is of the essence. We have just a few more years to protect the globe’s last forests.”

– Clóvis Borges

Executive Director, Society for Wildlife Research and Environmental Education



to willingly mitigate greenhouse gas emissions if doing so could constrain their ability to grow.

But if better accounting mechanisms can be designed, they could prompt a shift in policy priorities—to build more climate awareness into development activities, to adopt more pro-poor climate solutions, and to take advantage of co-benefits for both development and the environment wherever possible to stimulate funding and support. These co-benefits are apparent in a number of areas where new alliances for action might be forged—in particular, tropical forests, agriculture, health, clean energy, and disaster preparedness.

Conserving Tropical Forests

Tropical forests—which hold most of the world’s forest carbon—are disappearing globally at the alarming rate of 5 percent each decade. Every year, more than 13 million hectares of forest are lost, along with countless, largely unknown species and ecosystem functions.¹⁰ And this problem is very concentrated; Indonesia and Brazil together are responsible for 50 percent of global deforestation, placing these two countries among the top five climate polluters. More than 90 percent of global deforestation occurs in just two dozen countries with tropical forests.¹¹

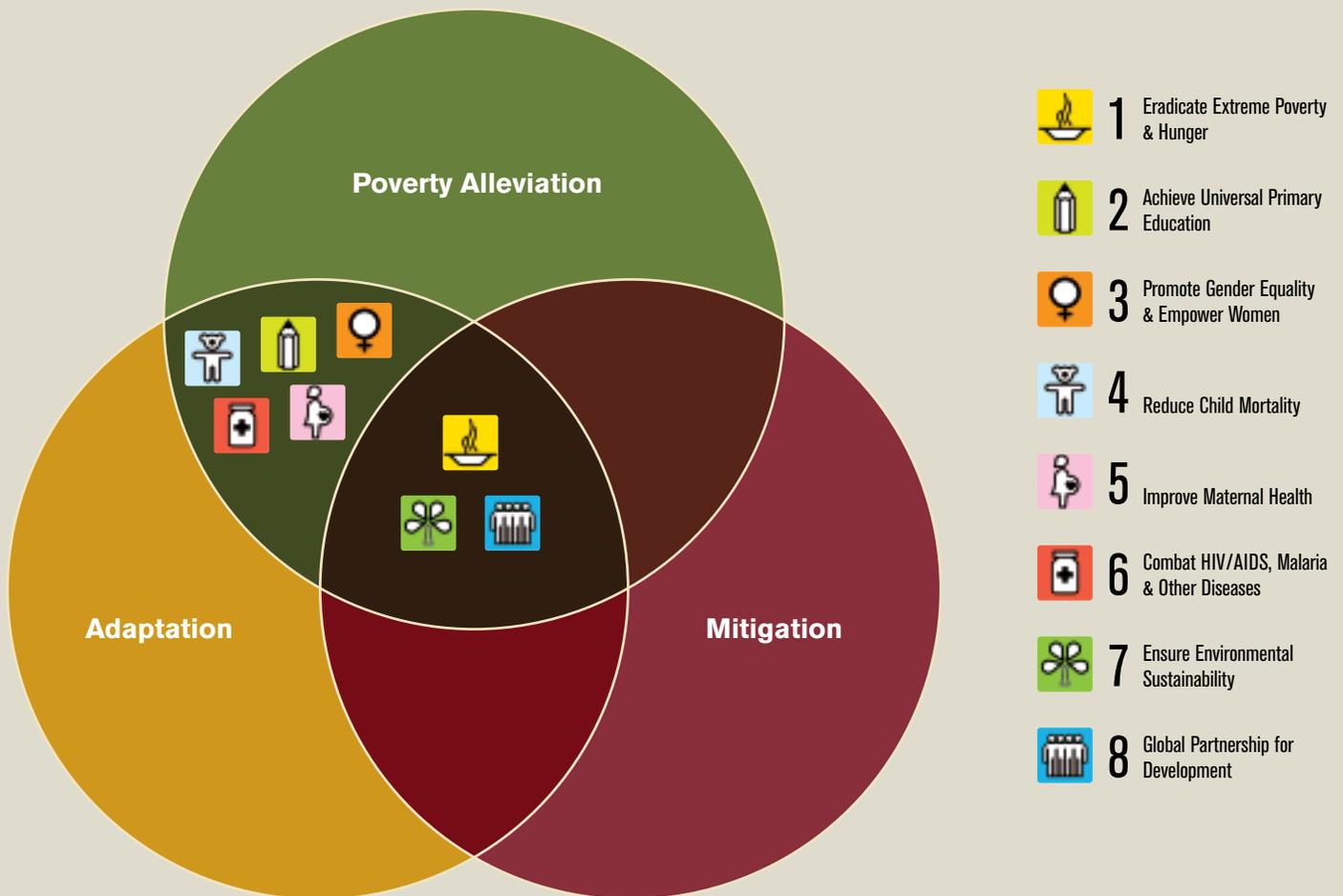
Astonishingly, tropical deforestation contributes roughly 20 percent of global greenhouse gas emissions, a share larger than the transportation sector. In other words, deforestation is doing more

to deepen the climate crisis than all the cars, trucks, ships, and planes in the world. Slowing this process would seem an obvious target for mitigation efforts. Though significant research and investment are still needed to make affordable, efficient, and safe zero-emission cars and power plants, we do not need new technologies to conserve and restore the Earth’s forests.

The major drivers of tropical forest degradation today are agriculture and logging—with agriculture (farming and ranching) accounting for 75 percent of deforestation, if not more.¹² The pressure to convert native forests into agricultural lands is driven by the market, which puts a price signal on agricultural commodities but not on the benefits that forests provide. Paradoxically, European and American initiatives to promote biofuels for transportation may be accelerating tropical deforestation, as natural wilderness is razed or burned to make room for palm oil plantations and displaced crops. (Even more perversely, a subsidy designed to encourage the U.S. production of biofuels has encouraged a practice termed “splash and dash,” in which biodiesel produced abroad is brought to the United States to be blended with U.S. diesel in order to benefit from the subsidy, and then transported to Europe for sale. Some European companies have even shipped their own fuel all the way to the United States for a “splash” and then “dashed” back to Europe—hardly the kind of environmentally friendly behavior the subsidy was intended to promote.)



Figure 2. Climate Change, Global Poverty, and the Millennium Development Goals





“The international community cannot wait until forestry offsets are perfected—when we know with certainty that leakage won’t occur. Doing so would be a classic case of letting perfection be the enemy of the good, because you can imagine how long it will take to have a perfect global system in place with absolutely no leakage. There will be no rainforest left. Further, the climate and forests community now recognizes that much progress has been made toward overcoming the technical challenges associated with accounting for reduced deforestation and degradation. While there is more work and research to do, the fundamental solutions are recognized and should therefore be less likely to block consensus.”

— Mark Tercek
President and Chief Executive Officer,
The Nature Conservancy

Unless there is a dramatic change of course by the middle of this century, only islands of tropical forests may remain amid an ocean of ecological change, with potentially devastating consequences for the poor and the planet. Yet changing the equation on forestry could be a global triple win—curbing greenhouse gas emissions, bolstering resilience, and raising the living standards of the poor. Moreover, global carbon offset markets and other financing mechanisms provide cost-effective ways to reduce emissions and generate income for impoverished forest-dwelling communities and forest-rich developing countries. Leading economic studies predict that the costs of reducing emissions from deforestation are equal to or less than costs of most other emission mitigation strategies, although these studies offer a range of predictions. Given World Bank estimates of \$5 per ton of forest carbon,¹³ the cost of forest conservation would be only one-eighth the cost of non-forestry carbon offset securities today in Europe.

The gap between the cost of avoiding deforestation in the tropics and the price of carbon in global markets illuminates the potential sustainable development returns from forest conservation and sustainable forest management to developing countries and rural communities. Today, the forest carbon offset market is less than \$100 million, only 0.16 percent of the \$64 billion worldwide market for carbon-denominated assets.¹⁴ If current estimates are right, scaling up these forest carbon

offset markets could yield annual transfers of more than \$30 billion a year to developing nations¹⁵—equivalent to almost a third of current official development assistance.

For the markets to take off, however, measures will have to be found to structure enforcement and accountability into forestry products, reassuring policymakers, regulators, and investors that carbon offsets have practical value. Among the technical concerns to be addressed are permanence (will the forests planted today still be here tomorrow?), additionality (would the activity have happened anyway?), leakage (will a reforestation project in one place result in land-clearing somewhere else?), measurement, and verification standards.¹⁶ These types of innovative efforts are emerging in voluntary markets, where companies that emit large quantities of greenhouse gases are forming alliances with development and environmental NGOs to finance forest conservation and restoration activities.

Beyond reducing greenhouse gas emissions, forest conservation can also be a vital strategy for reducing the climate vulnerability of poor people. The World Bank reports that 90 percent of those living on less than a dollar a day depend on forests for part of their food, fuel, or livelihoods. Forests tend to soak up rainwater and release it slowly, thereby acting as a natural defense against flooding and drought. Forests can improve water quality by filtering harmful pollutants, pathogens, and sediments that can cause illness in people or

Green Growth?

The energy-growth puzzle is the most critical challenge for policymakers seeking to implement viable global carbon mitigation strategies. A vital element in solving this puzzle is how to develop and deploy clean technologies that will fuel economic growth in a carbon-constrained world. Most notably, these technologies must be adopted in the world's largest carbon-emitting countries both in the near and long terms—namely, rapidly emerging and OECD nations. To do so, proven technologies must be cost-competitive, brought to sustainable scale, and effectively deployed.

(Although many pollutants seem to follow the so-called environmental Kuznets curve, rising with income until a certain threshold is met and then declining thereafter, carbon emissions do not follow this pattern; though emission intensity tends to diminish at high levels of income, emissions rise monotonically with income at every level. In other words, it appears that energy is a key ingredient in economic development.)

Today, half the world's greenhouse gas emissions come from developing nations. But in 2030, carbon dioxide emissions from non-OECD countries are projected to exceed those from OECD countries by 72 percent. According to the U.S. Energy Information Agency, most of the emissions growth in rising powers will come from the consumption of fossil fuels (mainly coal, gas, and petroleum), which are feeding power generation and transportation needs.

To meet this global challenge, private players are leveraging their considerable assets by investing in the development of cutting-edge, clean energy technologies. Venture capital firms in Silicon Valley are investing billions in revolutionizing various aspects of the energy economy. The firm Kleiner Perkins Caufield & Byers alone has financed forty different green-technology companies and raised a total of about \$1 billion for clean technologies. Khosla Ventures is investing in firms working on next-generation synthetic fuels and cellulosic ethanol, in addition to solar thermal, building materials, lighting, water, and energy efficiency. Challenging us to imagine cars and cement factories that mitigate carbon and algae that compete with corn and sugar as a viable biofuel, venture capitalists are

driving the development of those technologies that will be critical in forging green growth. Google.org plans to spend \$500 million on developing utility-scale, inexpensive energy alternatives to coal. Through Renewable Energy Cheaper Than Coal (RE<C), Google.org will develop electricity from renewable energy sources—focusing on solar thermal power, wind power, and enhanced geothermal systems—that are cheaper than electricity produced from coal, hopefully in less than a decade. With coal projected to command roughly 30 percent of the world's final energy consumption by 2030, investment in research and development for energy alternatives and carbon capture and storage will be critical.

Because few developing countries have the financial or technical capacity to adopt advanced energy technologies and energy-efficiency practices, technology transfers will be vital to achieve zero emissions growth in the near term. Several mechanisms, including the Global Environment Facility and the Group of Eight–endorsed Clean Technology Fund, show how donor nations can use development aid to subsidize the adoption of clean energy technologies. The Kyoto Protocol's Clean Development Mechanism is an earlier illustration of a market-based effort that was designed to achieve the same end. To be effective, these transfers should promote investments in public transportation, renewable energy sources, and energy efficiency that benefit poor consumers by lowering costs, increasing access, and securing supply.

Although economic research has shown that growth itself is a key contributor to a society's commitment to take on certain types of environmental challenges, the climate crisis requires the world to explore uncharted pathways of growth. For the world to avert unacceptable climate risks, the richest nations are clearly in the best position and have the greatest responsibility to act first in pioneering new energy paradigms, but the largest and fastest-growing developing nations must also contribute.





livestock. Forests also provide other less tangible benefits to poor communities. In the Amazon River Basin, for example, indigenous groups consider forest conservation essential to the preservation of their cultures, traditional livelihoods, and religious practices.

By the same token, according to a study by the conservation NGO Forest Trends, poor communities that depend on forests have proven to be excellent stewards of forest resources, “spending significant amounts of time, labor, and financial resources on forest management and conservation activities, conservatively estimated as at least US\$1.2 billion to US\$2.6 billion per year,” which is more than twice the level of international development assistance for conserving protected forests.¹⁷

Fortunately, there are major opportunities for conserving forests in ways that will benefit both poor people and the Earth’s climate. First, the international community is gearing up to fully include the forest sector in the global climate agreement that will cover the period after 2012, when the Kyoto Protocol expires. This will address a major deficiency of the protocol, which provides no incentives to reduce deforestation (it does provide modest incentives to reforest land but not to conserve it in the first place).

Second, key national and regional climate programs are moving toward provisions that would generate sizable new resources for the conservation of carbon-rich tropical forests in developing

nations. Several bills pending before the U.S. Congress would mobilize billions of dollars a year for forest conservation. California has already enacted climate legislation that creates economic incentives for forest conservation, potentially including those in the tropics. And after a decade of resisting the integration of the forestry sector into climate policy, the European Union is now showing early signs of opening up its enormously influential Emissions Trading Scheme to tropical forestry projects.

A key challenge, however, will be to grow the connective tissue to link global frameworks with local forestry efforts—from local producer organizations to supply networks to community-company forestry partnerships. Communities must be empowered to shape and govern these programs, with tenure rights and appropriate business training. They need clear communications channels to governments, so policymakers can be informed by realities and needs on the ground. And new financial mechanisms must be created to connect local forest communities to international polluters and to aggregate small-scale forest conservation efforts for global markets.



Photo by Alex Irvin

“Three critical constraints have entrenched lackluster productivity in small-scale farms beginning in the field and extending across the entire agricultural value chain: land titles and ill-defined property rights, access to technology, and poor infrastructure. Revitalizing this sector will be critical in overcoming deep-seated poverty across Africa.”

– **Namanga Ngongi**
President, Alliance for a Green Revolution in Africa (AGRA)

Boosting Agriculture

Agriculture is fundamental to human well-being and is an engine of economic growth. As the World Bank has found, the growth of gross domestic product (GDP) generated in agriculture, on average, is four times more effective in benefiting the poorest half of the world's population than growth generated outside agriculture. Yet despite the fact that some 75 percent of the world's poor live in rural areas, only 4 percent of official development aid is currently directed toward agriculture.¹⁸ Bolstering this sector should be integral to any poverty reduction strategy—especially in the face of impending climate impacts.

Climate-driven changes in global agricultural output will acutely affect poor households in the developing world. According to the Yale University economist Robert Mendelsohn, reductions will be especially severe in rain-fed crop farming (as distinct from irrigated farming and livestock management); for example, Chinese farmers on rain-fed farms will likely lose annual net revenue of \$95 per hectare per degree Celsius, while their African counterparts will lose \$28.¹⁹ Plus, declining yields, whether stemming from floods, droughts, soil erosion, or increased pests, could increase global food prices—driving even more families into hunger, malnutrition, and despair.

In addition, agricultural shortfalls will hurt developing countries' economies—potentially sparking riots and instability, along with new types of state weakness. Agriculture accounts for about

30 percent of GDP in developing countries. In Sub-Saharan Africa, a region heavily reliant on agriculture for overall growth, reduced crop yields could dramatically shrink government coffers, thereby placing greater strain on already-fragile infrastructure and services.

Boosting agricultural yields will require action on numerous fronts. First will be the development of new adaptive strains of agriculture, such as crops that can fertilize themselves or withstand heat waves and droughts. Agronomists, biotechnologists, and the private sector have critical roles to play in this endeavor—and despite the concerns associated with genetically modified organisms (GMOs), it is likely that GMOs will be part of the agricultural response to climate change, especially because new drought-resistant cultivars that require less time to grow may also be lacking in crucial nutrients, which GMOs can help restore. Additional adaptations include drip irrigation and integrated soil management to fortify depleted soils, and financial mechanisms to ensure that poor smallholder farmers can gain access to needed technologies.

Some experts advocate switching to more productive and income-generating crops in certain regions. A number of studies have shown that in Sub-Saharan Africa, movement away from maize and millet to vegetables and fruits could significantly improve income.²⁰ At the same time, other analysts caution that additional reliance on cash crops might exacerbate food insecurity, leading

“Climate change presents yet another challenge to small farmers in the developing world struggling to overcome hunger and poverty. Issues like crop yields, droughts and floods, and water management—already critical—will be even more important as the effects of climate change increase. The Bill & Melinda Gates Foundation is working to help small farmers boost their productivity and incomes, and part of this work clearly includes helping them adapt to the consequences of climate change through the development of drought-resistant crops, improved irrigation efficiency, and other means.”

– **Sylvia Mathews Burwell**
*President, Global Development Program,
Bill & Melinda Gates Foundation*



Insuring against an Increasingly Volatile Climate

Between 1991 and 2005, nearly 3.5 billion people were affected by natural disasters—of which approximately 90 percent were in developing countries—that could mean losing one's crops, health, home, or livelihood. According to the IPCC, increased urbanization plays a part, placing ever larger populations in vulnerable areas. Changing weather patterns are also to blame; though scientists are loath to connect particular weather incidents to climate change, many are growing more convinced that global warming will produce more extreme and potentially more frequent storms, droughts, and floods.

Insurance instruments hold great promise for building climate resilience in vulnerable communities throughout the developing world because they offer a formal way to spread risk and fund reconstruction. For individuals, climate insurance can help them survive the immediate hardships of a disaster and allow them to rehabilitate crops and businesses. Insurance can also be a factor in reducing people's vulnerability to future climate events if, for example, insurance payouts stipulate climate-conscious reconstruction in less vulnerable locations. According to the U.K. Department for International Development, the key to ensuring that these products find a viable market in the developing world is affordability and an enabling policy environment.

A number of climate insurance derivative products are being tested across the globe at the household level through public-private partnerships. According to the IPCC scientist Ian Burton, a canvassing of eighteen projects under way or in the pipeline revealed that weather index insurance is the most popular instrument currently employed because it keeps down administrative costs, minimizes moral hazard, and decreases covariate risks. This type of insurance relies on the occurrence of a weather event (for example, rainfall), rather than the consequences of weather (crop failure). Using a weather index offers the advantage of remote measurement, which decreases the need for onsite visits as well as transaction costs. Further, the index is independently verifiable and can be tailored to fairly homogeneous regions.

This model holds particular promise for agriculture, where payment is triggered automatically if rainfall in a given season is less than the historical average, regardless of the crop outcome. For the smallholder farmers of the developing world, this means protection from food insecurity and a loss of livelihood—and potentially malnutrition or famine.

The World Bank's Commodity Risk Management Group partnered with the National Smallholder Farmers Association of Malawi and the Insurance Association of Malawi to pilot weather index insurance for groundnut farmers in 2005. Loans were provided to buy high-quality groundnut seeds, as long as farmers purchased weather insurance. Approximately 1,000 farmers in four subregions participated. Only one of the four subregions received inadequate rainfall to support seed growth and maturation, resulting in a \$0.68 payment to each farmer in that region. This is but one example of a public-private partnership forged to ensure broad accessibility to climate insurance and encourage climate change adaptation. Other pilot projects include the UN World Food Program's weather index insurance partnership with AxaRe in Ethiopia and the ICICI Lombard and International Finance Corporation's rainfall index insurance in India. For a more comprehensive survey of additional projects that are under way, see Ian Burton and Thea Dickinson, "Exploring the Potential for Public-Private Insurance to Help the World's Poor to Adapt and Thrive as the Climate Changes," in *Climate Change and Global Poverty: A Billion Lives in the Balance?* ed. Lael Brainard, Abigail Jones, and Nigel Purvis (Brookings, forthcoming).



Photo by Alex Irvin

“There are probably 101 ways to develop biofuels irresponsibly. But done correctly, biofuels could advance drought-resistance and nitrogen fixation and needn’t compete with food crops if grown on marginal land. They hold too much promise for global development and climate change not to continue responsibly developing their potential.”

– **Steven Chu**
*Director, Lawrence Berkeley National Laboratory;
U.S. Secretary of Energy (designee)*

poor countries to devote precious farmland to food that their own people do not eat. If food commodity prices fall, or global transportation prices increase, an economic development strategy built on exportable cash crops could result in even greater hardships for poor countries.

Developing country governments have indispensable roles to play in areas such as planning, investment in rural infrastructure, agricultural extension training, and, crucially, land tenure rights, which allow poor farmers to make sound long-term decisions about the stewardship of their land. This is especially important because many poor farmers are women, who often not only lack property rights but also inheritance rights. Without title to their land, they cannot borrow against it or build financial security; and thus they are unable to make the investments that would boost their harvest yields.

Outside actors can also be important catalysts for change. The Rockefeller Foundation and the Bill & Melinda Gates Foundation are financing the Alliance for a Green Revolution in Africa, an association of farmers, agricultural businesses, scientists, and research institutions. The alliance works to increase the productivity of small-scale farmers in Africa by ensuring that they have access to high-quality seeds, organic fertilizers, and a reliable source of water, as well as to extension services, storage, transport, and financial support to help them sell their crops for a profit. Just as U.S. agronomists, philanthropists,

and aid officials forty years ago led the Green Revolution—an investment program in agricultural research and infrastructure that enabled global food production to skyrocket—now the goal is a second, even greener revolution that allows us to double food production by 2050 and feed the world without punishing the planet.

Bolstering Health

Health is another area where clear co-benefits emerge when climate change and development solutions are aligned. From the perspective of mitigating greenhouse gas emissions, clean energy choices for home use in poor communities would have enormous health and human implications. More than half the world’s population still relies for energy on biomass fuel and coal, which generate greenhouse gases even more dangerous than carbon, and which take a painful toll on well-being. Four thousand people die each day from indoor air pollution—a greater loss than from malaria.

Moreover, the time-consuming burden of collecting fuel sources falls overwhelmingly on women and girls, who often are forced to forgo education to care for their families. These realities create opportunities for development and climate champions to band together, and to argue that clean energy technologies like solar cook stoves are also great leaps forward for development, especially in the areas of human health and female empowerment.

“Ensuring that the poor have title to their land gives them a formal stake in this planet. And in order to care about the planet, you first have to have a stake in it.”

– **Madeleine Albright**
*Principal, Albright Group LLC; Former U.S.
Secretary of State*



More traditional health interventions also have crucial climate connections, strengthening people's resiliency in the face of increased stress. As the IPCC's Fourth Assessment Report notes, "The health of populations is an important element of adaptive capacity. Where there is a heavy burden of disease and disability, the effects of climate change are likely to be more severe than otherwise."²¹ Inevitably, the young, the elderly, and the weak are the most at risk.

But in addition to bracing populations for climate change, health interventions will be necessary to help the vulnerable cope. Climate change will alter the conditions for physical traumas, infectious diseases, and noninfectious drivers of health. Extreme weather events like heat waves, cyclones, hurricanes, and floods bring direct physical consequences and are associated with outbreaks like cholera. A warming world is having effects on pathogens and vector-borne diseases, extending the reach of malaria, dengue fever, and other illnesses as mosquitoes and ticks move farther north. And changes in agriculture, air quality, and water availability will affect human nutrition, immunology, toxicology, and physiology. For example, according to the World Health Organization (WHO), almost 90 percent of the burden of diarrheal disease—which claims 1.8 million people a year—results from a lack of clean water and sanitation.²² These numbers can be expected to rise in a world of climate-induced water stress.

The ability to mitigate the health effects of climate change will vary from place to place. This variability highlights the need for strong public health systems with broad expertise and deep capacity. But given that these projected health effects are bound up in problems with which the development community is already grappling, much can be accomplished through redoubled investments in existing approaches. Malnutrition, diarrheal disease, and malaria are already the major killers of children in Southeast Asia and Sub-Saharan Africa. From the health community's perspective, what is most urgently needed is not a brand new focus on climate but the financial resources and political support to accelerate ongoing endeavors. As the WHO senior scientist Diarmid Campbell-Lendrum cautions, "Though an important risk, any incremental increase in malaria from climate change will be dwarfed in the foreseeable future by the underlying burden of disease already prevalent in the developing world. If we go in asking people to worry about the additional burden of climate change rather than addressing near-term problems on the ground, we actually risk alienating local stakeholders. We need to be clearer that controlling these diseases now will both save lives immediately and reduce our vulnerability to future climate change."

At the same time, climate change will also demand innovative health approaches. Normal cycles of problem identification, solution finding,



Photo by Alex Irvin

“In the past, the U.S. military has proven that it can do disaster relief quite effectively; witness the Kashmir earthquake or the Asian tsunami. Given the U.S. military’s current focus on counterinsurgencies, it will take a major sea change to get us to a point where we can effectively respond to climate change–induced disasters. We’ve changed course before. We can certainly do it again, but it won’t be quick.”

– **Douglas Lute**

*Lieutenant General, U.S. Army; Assistant to President George W. Bush;
U.S. Deputy National Security Advisor for Iraq and Afghanistan*

and decisionmaking may not occur quickly enough when environmental “tipping points” are reached.²³ To give just one example, the African population at risk of malaria may grow by 90 million by 2030,²⁴ and mortality rates will be greater in areas that have previously been unexposed. The world may face large-scale public health challenges in a short period of time, yet it lacks the capacity to anticipate, mobilize, and prioritize effective responses.

According to the global health and climate change expert Kristie L. Ebi, only two schools of public health worldwide offer PhD-level training in climate change and health. In the United States, fewer than ten researchers outside the federal government are focusing on these challenges full time. Without priority-setting tools today, we may find ourselves without trained specialists tomorrow. And without proper investment, who will be able to tell us what effects climate change will have on air quality, heat waves, and malaria?

For some climate-related challenges—perhaps those stemming from physical trauma—replicating and expanding successful responses may yield positive results. For example, Bangladesh has done much to make its citizens less vulnerable to storms and flooding, and sharing its best practices globally holds promise. But this approach will not work for challenges linked with infectious diseases, because many climate-related diseases are both site-specific and path-dependent. Thus, intervention policies must be supplemented with

local knowledge and expertise, as well as better monitoring and early-warning systems.

WHO has significantly raised the profile of climate change in its endeavors, arguing that “the ultimate aim of mitigation and adaptation, and related development decisions, should be the protection and improvement of human well-being.”²⁵ WHO is working to raise public awareness, to strengthen public health systems to cope with climate effects, and to promote health development more broadly by integrating health considerations into policies in sectors such as energy, transport, water, and sanitation. The challenges are great, but public health offers a positive prism through which responsible climate-related choices can be encouraged—not just that the world must pay a price to avoid climate threats, but also that if we make smart investments, we can help save millions of lives.

Preparing for Disaster

Regrettably, a warmer world will also be a more violent one—exacerbating the hardships and suffering that can breed despair and chaos. In part, this violence will come from nature itself in the form of extreme weather events, which have the potential to set back or literally wipe out development gains.

Between 1990 and 1999, an estimated 188 million people a year were affected by extreme weather, droughts, floods, and other such disasters, six times more than the 31 million annually



Photo by Alex Irvin

“This year marks a dramatic milestone where the world’s urban population now outstrips its rural population. And as cities absorb ever-larger populations, urban planners will be making choices that will lock in their climate vulnerability for the next fifty years. The development and climate change communities must act in concert to ensure that these cities do not create climate vulnerabilities that put their core populations at high risk.”

– **Maria Blair**
Associate Vice President, Rockefeller Foundation

“Neither African governments nor development partners have invested in longitudinal research studies. Most of the research produced by local institutions is reactive and therefore of little use to policymakers. We need to invest in long-term research and to build databases that are housed in local institutions and can be used for proactive policy research on food security and climate change.”

– **Lindiwe Majele Sibanda**
Chief Executive Officer, FANRPAN

affected by armed conflict. Immense storms, like the massive cyclone that destroyed much of coastal Burma in May 2008, uproot millions of people from their homes; some experts believe that the number of environmental migrants and refugees could grow by tens of millions in the coming decades. As Thomas Fingar, then chairman of the National Intelligence Council, testified before the U.S. Congress, climate change may also put immigration pressures on the United States, especially because “almost one-fourth of the countries with the greatest percentage of population in low-elevation coastal zones are in the Caribbean.”²⁶ And the development setbacks suffered by disaster victims and environmental migrants are compounded by their displacement, as many people end up in makeshift camps or dysfunctional communities plagued by crime and violence.

In 2005, Hurricane Katrina and Hurricane Rita proved that even rich countries are vulnerable to extreme weather—as did the European heat wave of 2003, which claimed tens of thousands of lives. Yet in the future, poor countries and communities, particularly in Africa and Asia, will face the gravest risks. Their vulnerability is partly an accident of geography—because places near the equator and the poles and along seacoasts are likely to experience the most pronounced effects of climate change—but also partly a function of weak governance and internal strife. As a 2007 CNA Corporation report by the retired four-star general Anthony Zinni and others noted, “The U.S. was

able to absorb the displacement of people from the Gulf Coast in the wake of Hurricane Katrina without suffering economic or political collapse, but not without considerable turmoil.”²⁷ Failed and failing states—those with weak institutions, poor control over their borders, repressed populations, or marginal economies—stand a higher risk of being destabilized by climate change, further compounding their people’s misery and creating pressures on other nations to intervene.

This reality is being increasingly recognized by experts in the field, as evidenced by the recent flurry of reports from intelligence agencies, military officials, and scholars linking global warming with security challenges. We can no longer assume that natural disasters are infrequent, isolated events or allow uncertainty about the future to justify complacency. An ounce of prevention (for example, greenhouse gas emissions reduction) and readiness (disaster preparation and adaptation) will be worth a pound of cure—minimizing both the immediate humanitarian toll of a crisis and the potentially more devastating threat of ensuing conflicts and chaos.²⁸

Risk reduction solutions will need to come in many forms. Crops, human settlements, water supplies, and other critical resources will need to be made less vulnerable to natural disasters, sea-level rise, and other climate impacts—with a special focus on growing urban areas, where infrastructural decisions are now being made that could lock in their climate vulnerability for the



next several decades. Interventions may range from seawalls and floodgates to water-harvesting systems, soil conservation, and the like. In support of such goals, the Rockefeller Foundation has launched a five-year, \$70 million initiative to “catalyze attention, funding, and action in building climate change resilience for poor and vulnerable people globally”²⁹—connected to the foundation’s parallel effort to boost agriculture in Africa.

In addition, systems for surveillance, early warning, and forecasting must be improved for extreme weather, water stress, food stress, and public health so that governments and communities have the information to make intelligent choices. Unfortunately, the think tanks and research institutions that develop and maintain these types of systems are largely absent from the developing world. Only a fifth of the 5,000 think tanks worldwide are based in developing countries. Currently, for example, Sub-Saharan Africa has the world’s lowest density of meteorological stations. And without weather data, it is virtually impossible to predict severe weather events in the future or policies that might minimize their damage. To fill this void in the near term, international research consortia are becoming increasingly important. The Consultative Group on International Agricultural Research, a coalition of fifteen international research centers, is one example of a consortium that draws expertise from institutions around the world to assist in achieving sustainable food security in develop-

ing countries. The value of these collaborative organizations is immense, but it is no substitute to developing local capacity.

Another important option are new insurance instruments that buffer poor communities from risk and at the same time make adaptive behaviors more appealing. Bangladesh is demonstrating the enormous benefits to be gained from these risk reduction efforts. In 2003, it established the Comprehensive Disaster Management Programme (CDMP), within the Ministry of Food and Disaster Management, to prepare for the cyclones, tropical storms, floods, tidal surges, and tornados that regularly afflict it. The CDMP—which was launched and jointly funded with the help of the United Nations Development Program (UNDP) and the United Kingdom’s Department for International Development—is a long-term, multi-agency effort to build domestic capacity to deal with natural disasters.

The CDMP was put to the test in November 2007, when a category-five cyclone made landfall in Bangladesh, slamming the southwestern coast with heavy rains and winds of well over 100 miles an hour. About 3,500 people died—but more than 1.5 million were successfully warned and evacuated, thanks to a massive program to build shelters along the coast at strategic places and a school-based campaign to teach children how to guide their families to shelter. In contrast, Cyclone Nargis, which hit Burma six months later, claimed nearly 140,000 lives.



Photo by Alex Irvin

“Governance matters in recovering from natural disasters. Take, for example, Bangladesh’s recovery from Cyclone Sidr, in juxtaposition to Burma’s mobilization around Cyclone Nargis. As climate change magnifies and intensifies natural disasters, it’s vital to continue promoting and bolstering open societies which are better placed to respond to the dire needs of its people.”

– George Soros
*Founder and Chairman, Open Society Institute;
Chairman, Soros Fund Management*



Photo by Alex Irvin

“Building climate change knowledge requires harmonizing scientific understanding with the traditional know-how of communities. Because this information is not static, we must maintain a certain degree of flexibility as we incorporate long-term planning strategies with rapid response needs.”

– **Atiq Rahman**
Executive Director, Bangladesh Centre for Advanced Studies

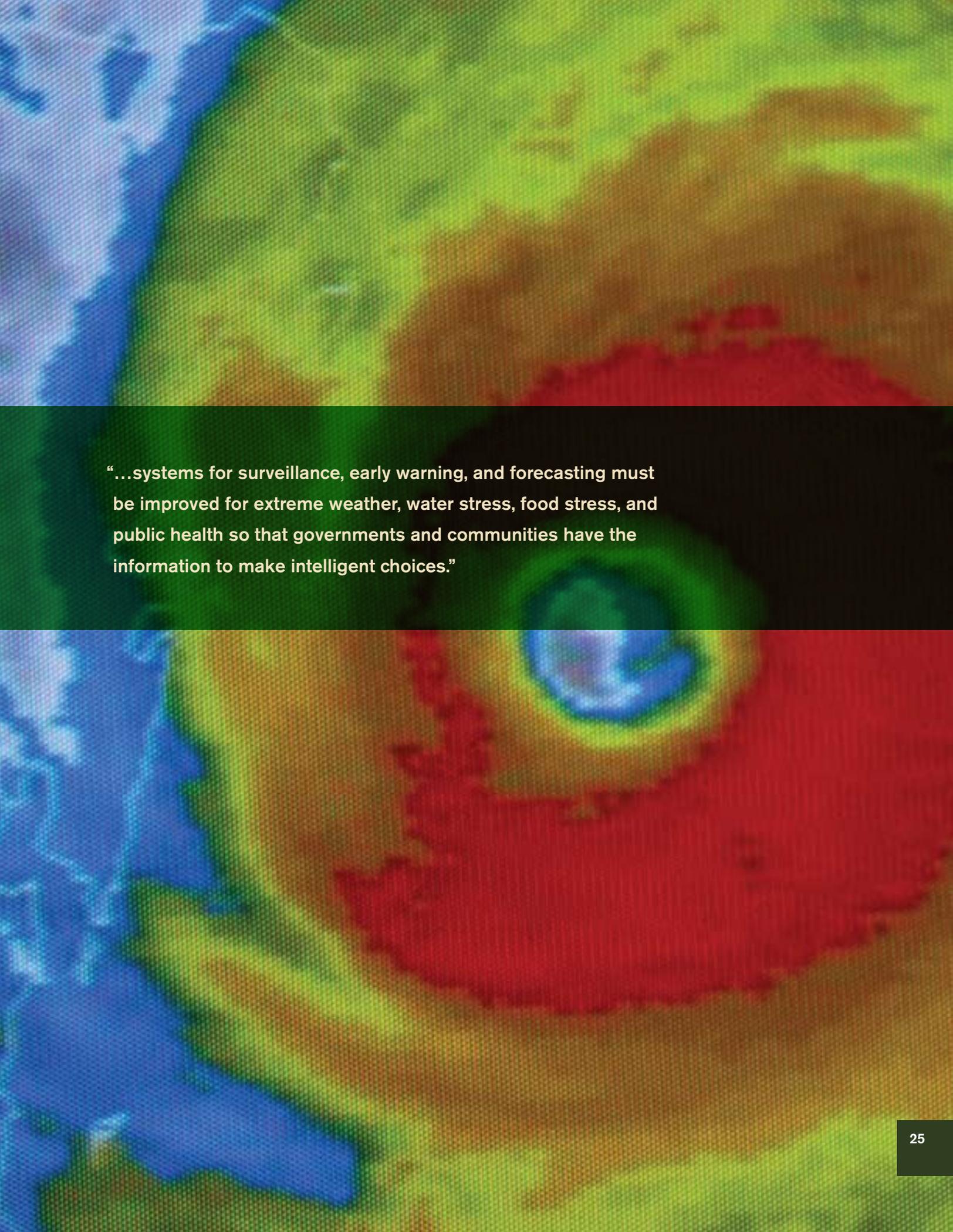
Broadening and strengthening these kinds of preventive efforts worldwide will require a mindset shift among planners and funders, for despite repeated experiences with costly disaster response and relief efforts, the world has typically underinvested in disaster prevention and risk reduction in developing countries. One step in the right direction is the Global Facility for Disaster Reduction and Recovery, created in 2006 through the World Bank and United Nations; the facility makes grants for disaster risk assessments, risk mitigation policies and strategies, disaster prevention projects, and additional financing for recovery.³⁰ As of June 2008, however, it had received contributions of only \$78 million—and none from the United States.

More broadly, the role of climate change in international peace and security must be integrated into ongoing planning related to multilateral peacemaking and humanitarian intervention. Early diplomatic engagement, bolstered by substantial food assistance and other aid, can help prevent bad situations from metastasizing into nightmares. And in a world of multiplying hot spots, the international community must be equipped to respond forcefully to several major humanitarian and security crises at once.

At the same time, some practitioners are concerned by the prospect of militarizing disaster relief and reconstruction. Though the U.S. military offered unparalleled capabilities in the wake of the 2004 Indian Ocean tsunami, U.S. forces—currently focused on counterinsurgency operations—are not

well prepared to serve as first responders in global emergencies. Moreover, as John Podesta and Peter Ogden argued in a November 2007 report on the security challenges of climate change, “it is possible that the United States will become reluctant to expend ever greater resources on overseas disaster relief, not to mention longer-term humanitarian and stabilization operations, as the effects of climate change begin to be felt more acutely at home.”³¹ And on the NGO side, some humanitarian organizations are concerned that elevating the military’s role as an aid provider may undermine the neutrality on which their organizations depend to gain access to all in need of help.

Perhaps it is not surprising, then, that General Zinni and his highly experienced military colleagues recommended in their report not only that the United States integrate climate change threats into its national security and defense strategies, but also that it work energetically to mitigate climate risk in the first place, and help less developed nations build their own capacity to better manage climate impacts.



“...systems for surveillance, early warning, and forecasting must be improved for extreme weather, water stress, food stress, and public health so that governments and communities have the information to make intelligent choices.”



Show Me the Money



The cost of adapting to climate change will depend greatly on the extent of global warming. If nations move swiftly to mitigate greenhouse gas emissions, the world will still need to adapt but to a lesser degree and at a lesser cost. This uncertainty makes predicting the adaptation price tag extremely difficult. Moreover, it is impossible to disentangle adaptation programs from traditional development efforts, which further complicates cost calculations.

Within the context of this great uncertainty, several global studies peg the likely cost of climate adaptation in developing nations at tens of billions of dollars a year. The UNDP suggests that \$86 billion annually may be needed by 2015.³² This is a daunting sum, yet it is only about a tenth of what developed countries currently spend on defense—and less than a seventh of what the United States has spent on the Iraq War since 2003.³³ In addition, in many cases the social benefits of adaptation programs will greatly exceed their costs—costs that will mount the longer adaptation investments are delayed.

But financing international adaptation is bound to be an uphill struggle—especially given that the Group of Eight’s pledges to increase development assistance by \$50 billion are still unmet, and that many donor countries have not yet systematically funded domestic climate resilience. So far, the global community’s multilateral financing

efforts have primarily taken the form of three funds created in 2001 under the auspices of the UN Framework Convention on Climate Change (UNFCCC): the Least Developed Country Fund, the Adaptation Fund, and the Special Climate Change Fund. The Global Environment Facility (GEF) has also started to fund small-scale adaptation projects through its core account, which was created in the early 1990s. Yet of the \$320 million pledged cumulatively so far through the UNFCCC funds, only \$154 million has been disbursed—nearly nine times less than what Americans spent on pet food each month in 2007. Moreover, it is apparent that even the entire \$320 million is woefully insufficient to the task. Without far greater political will and larger-scale funding commitments for donor contributions, the sums are unlikely to increase.

As its name indicates, the Adaptation Fund focuses on financing adaptation projects and strategies in developing nations. It is financed by a 2 percent tax on carbon offsets under the Kyoto Protocol’s Clean Development Mechanism, which allows industrial nations to meet part of their protocol targets for mitigating greenhouse gas emissions by funding emissions-reduction or -removal projects in developing countries. Experts predict that this tax could raise anywhere from \$160 million to \$950 million for adaptation by 2012. As agreed on by the nations meeting in Bali in 2007,



“For very vulnerable countries, adaptation to the adverse impacts of climate change is not perceived as a medium- or long-term planning problem. Adaptation is something we have to do today in response to the challenges we’re experiencing now.”

— Angus Friday
Chairman, Alliance of Small Island States of the United Nations; Permanent Representative of Grenada to the United Nations



the Adaptation Fund is housed for the moment in the GEF; but unlike the GEF's core account, the fund is accountable to a specialized governing board with heavy representation from developing countries and island states. Critics, however, doubt the Adaptation Fund's ability to mobilize adequate resources, given the small scale of the Clean Development Mechanism thus far and the United States' non-participation in Kyoto.

Ultimately, galvanizing sufficient funds requires an international consensus on a number of controversial questions, beginning with who should pay. Developed nations have agreed to help developing nations adapt, but they are eager to see climate change incorporated into developing countries' national budgets and existing official development assistance programs. In contrast, most developing nations believe that polluters should pay for the consequences of their pollution, viewing any resource transfer not as aid but as compensation for the injuries from climate change. Future international climate agreements are likely to clarify nations' responsibilities with respect to adaptation financing. Indeed, the nations meeting in Bali in 2007 agreed that the next global climate pact should enable enhanced action on the provision of financial resources to support adaptation, including "improved access to adequate, predictable and sustainable financial resources," such as "new and additional" official development assistance and concessional financing.

These equity and justice arguments reflect the climate burden's roots. According to the UNDP, the Netherlands has a greater carbon footprint than Bolivia, Colombia, Uruguay, Peru, and the seven countries of Central America combined; the United Kingdom emits more carbon dioxide than Egypt, Nigeria, Pakistan, and Vietnam put together; and an average air-conditioning unit in Florida emits more carbon dioxide in a year than a person in Cambodia does in a lifetime.³⁴ Now that we know that greenhouse gas emissions are to blame for climate change, it means that the behavior of people in Rotterdam, London, and Orlando risks further degrading the lives of poor families half a world away—and making those families foot the bill for their suffering victimizes them twice.

Such moral arguments have powerful emotional resonance and eloquent international champions. Archbishop Desmond Tutu has warned that we are moving toward a world of "adaptation apartheid." At the same time, seasoned veterans of U.S. politics caution that if the debate is pushed into an adversarial, "perpetrator versus victim" mode, it will make the Herculean task of securing the requisite funding even harder—at least in the U.S. context. Given the urgency and the stakes, if demanding climate justice means delaying climate action, that may be a trade-off the world cannot afford to make.

The next set of questions center on how resources should be raised and governed. For some, global vertical funds are the modality of choice for dealing with public goods problems. If recent experience is any guide, however, donors may be willing to put more money into national funds that they can control. For example, the Global Fund to Fight AIDS, Tuberculosis, and Malaria, which was created in 2002, has committed \$14.9 billion to date; but since 2004, the United States alone has committed \$18.8 billion under its President's Emergency Fund for AIDS—also using that domestic program to channel its \$3.3 billion contribution to the Global Fund. At the same time, given the desire to mobilize large, predictable sums of money annually over a sustained period of time, resource mobilization mechanisms with some degree of automaticity have considerable appeal in principle, though not much of a track record.

These stark differences in perspective have given rise to divergent views about how additional adaptation funding should be generated.³⁵ China, for instance, has proposed that developed countries should allocate 0.5 percent of their GDP to support actions taken by developing countries to tackle climate change. This would currently amount to \$185 billion a year for mitigation, technology transfer, and adaptation combined.³⁶

In contrast, in both the United States and the European Union member states, policymakers are considering domestic legislative proposals to create new adaptation funds that would be capitalized with revenues from auctioning rights for greenhouse gas emissions to polluters under



national and regional cap-and-trade programs. The Boxer-Lieberman-Warner Bill, introduced in Congress in May 2008, would have established a program that could have generated approximately \$3 billion annually for international adaptation in its first three years (starting at 1 percent of total auction revenues), increasing to as much as \$25 billion a year over time (up to 7 percent of auction revenues).³⁷ In Europe, annual auction revenues from the Emissions Trading Scheme are estimated to reach €75 billion (\$113 billion) in 2020, of which 20 percent, or €1.5 billion (\$2.3 billion), would be dedicated to climate change–related activities, including adaptation.³⁸ These legislative proposals have engendered significant opposition from lawmakers who describe the measures as intended to ship huge sums of taxpayer money overseas to corrupt and ineffective governments. The level of political support in developed nations for greatly increased adaptation funding remains unclear and untested.

Taxes on international air travel and shipping represent potential new sources for adaptation funding that would be more predictable than yearly appropriations. Establishing a \$7 levy on each international flight, for example, would result in \$14 billion in additional revenues annually.³⁹ By way of precedent, France now collects an “international solidarity contribution” on international flights to generate revenues for international efforts to fight infectious diseases. Other countries favor levies that would go to a global body

as opposed to national treasuries—perhaps by increasing the current 2 percent tax on the Clean Development Mechanism.

However adaptation monies are raised, the structure and governance of new adaptation funds has proven controversial, as evidenced in early 2008 by the uproar within the climate change and development communities over the World Bank’s new Climate Investment Funds, which have been endorsed by the Group of Eight. Those funds were originally intended to be managed by donors in accordance with traditional World Bank rules. Developing nations, which view adaptation assistance as compensation by polluters to which they are entitled, insisted that allocation decisions be made by national governments or, at a minimum, by global bodies in which developing countries have majority representation. Balancing donors’ desires for control, accountability, and supervision with developing countries’ demands for greater voice and control remains a significant challenge.

Different considerations come into play when determining how new resources should be allocated. Though funds may be raised vertically, adaptation planning and implementation must be done across sectors at the national, local, and sometimes regional levels. And to be effective, this assistance must be provided horizontally and be highly integrated with national development planning, in four main ways.

First, it is critical to make national governments the centerpiece for coordination. So far, donors



Photo by Barefoot Photographers of Tilonia



Photo by Alex Irvin

“Funding gaps will continue to plague climate change adaptation efforts if we don’t leverage the paltry funds that are currently available. Only \$150 million has actually been distributed by the three United Nations Framework Convention on Climate Change adaptation funds currently in operation, though the World Bank estimates that needs could be anywhere between \$9 and \$41 billion annually. A fund of funds is needed that matches local governments’ adaptation needs perhaps two for one, three for one, or even five for one. The demands are huge. We have to start thinking outside the box to generate greater supply.”

– **Richard C. Blum**
Chairman and President, Blum Capital Partners, LP

have established ten separate, multilateral climate change adaptation financing instruments, with different conditionalities attached;⁴⁰ but each national government needs to own its development plans and to be the place where resources come together. The development community has worked hard in recent years to reduce the burdensome transaction costs associated with fragmented foreign assistance. It would be a setback to start building those costs back in.

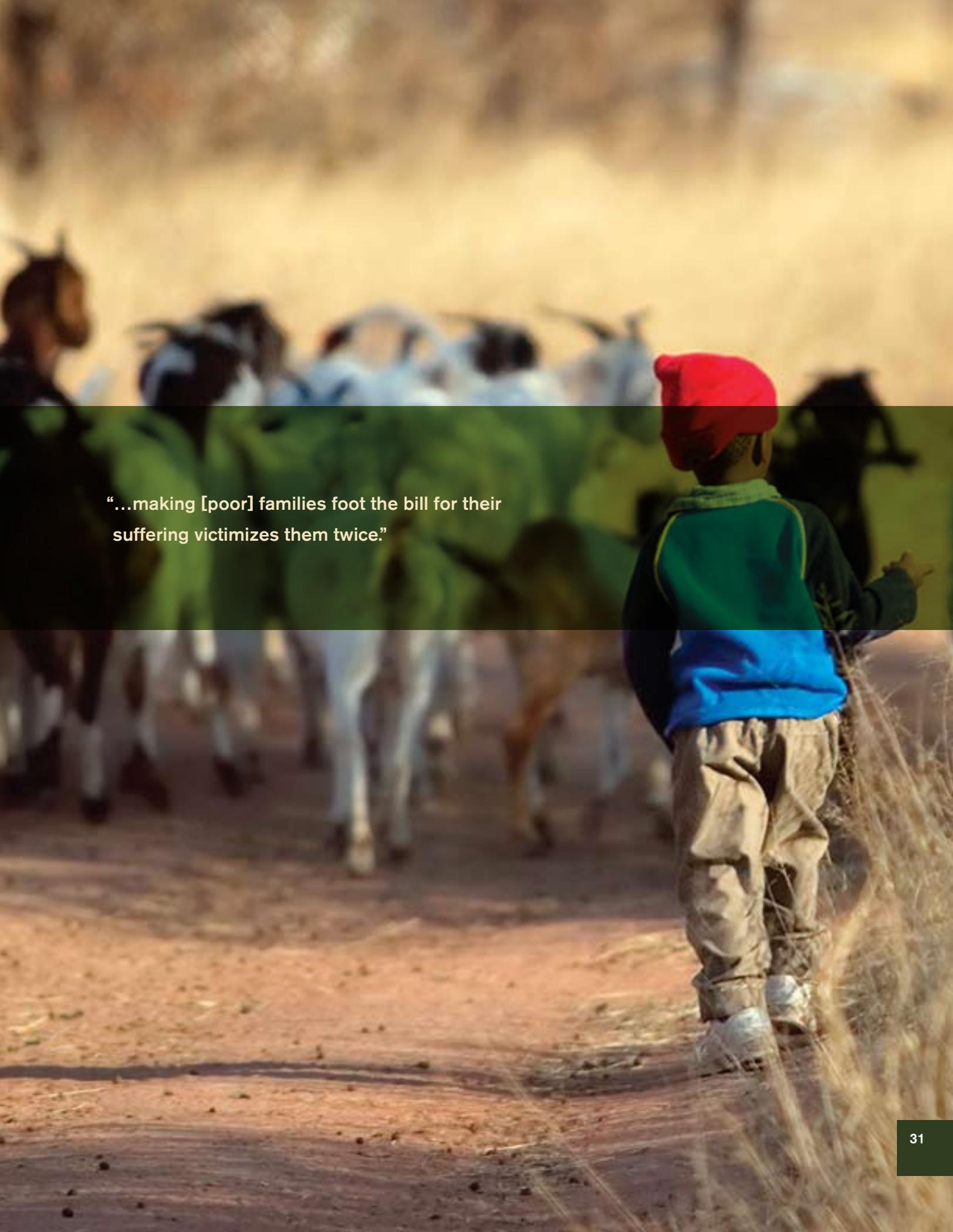
Second, stakeholder involvement is essential, as is private sector participation. Public monies and leadership, though essential, will not be enough. Third, national budgets matter; developing countries will need to demonstrate their commitment through their own budgeting priorities. Fourth and finally, there need to be formalized ways to mainstream climate considerations into development strategies—as a matter of not just “climate-proofing” development but also embedding climate sensitivity into development’s DNA.

Currently, coordinating mechanisms at the supranational level are forcing governments to take stock of their vulnerabilities and develop national action plans to cope with climate impacts. For example, top-down efforts like the United Nations’ National Adaptation Programs of Action (NAPAs) serve as vehicles for national governments in the least-developed countries to identify priority adaptation activities across sectors and government agencies. So far, however, NAPAs are often managed by environmental ministries

instead of across governments as a whole.

Meanwhile, on the development side, since 1999, low-income countries have worked with domestic stakeholders, external funders, and the International Monetary Fund and World Bank to develop comprehensive Poverty Reduction Strategy Papers (PRSPs), which lay out “the macroeconomic, structural and social policies and programs that a country will pursue over several years to promote broad-based growth and reduce poverty, as well as external financing needs and the associated sources of financing.”⁴¹ Generally, however, PRSPs do not focus on climate change or climate risks to development.

Fusing or at least bringing together NAPAs and PRSPs could help to ensure that developing countries fully integrate their climate concerns into broader domestic goals for reducing poverty and creating wealth. At the same time, such harmonization could minimize duplication and the associated transaction costs, as well as the threat of “maladaptation”—whether through climate-driven activities that inadvertently worsen human development or development programs that result in greater vulnerability to climate change.

A young child, seen from behind, stands on a dirt path. The child is wearing a bright red turban, a blue long-sleeved shirt with green accents on the sleeves, and light-colored, worn-in pants. The child is looking towards a herd of cows, some white and some brown, in a rural, dusty environment. The background is slightly blurred, showing more of the herd and the dry ground. The lighting suggests it might be late afternoon or early morning.

“...making [poor] families foot the bill for their suffering victimizes them twice.”



Cool Climate



Given the scale and complexity of the climate change–poverty challenge, the massive resources required, and the short window in which to act, many experts believe that progress will depend on mobilizing public support around the world—itsself a challenging task. We know that individuals in the developing world are attuned to their changing climate; according to a 2007 Gallup Poll, 56 percent of respondents surveyed in twelve Sub-Saharan countries (Benin, Burkina Faso, Cameroon, Ethiopia, Kenya, Malawi, Mozambique, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe) agree that water is getting harder to find; the majority of respondents in most countries also believe that their lifestyles will deteriorate if the climate changes.⁴² Yet many residents of developing countries are unaware of the anthropogenic origins of climate change and its likely long-term impacts. This information gap is compounded by a lack of media coverage; for example, only 9 percent of the journalists registered to cover the Bali climate conference came from the developing world.⁴³

In developed countries, awareness and concern regarding climate change have grown significantly over the past decade, especially in the aftermath of the film *An Inconvenient Truth* and the awarding of the Nobel Peace Prize to Al Gore and the Intergovernmental Panel on Climate Change. Yet many people do not understand the

policies or behaviors that are needed to solve the climate crisis. And a gap remains between awareness and a sense of urgency; nearly three in four Americans say there is “solid evidence” of global warming—yet a national survey by the Pew Research Center for the People and the Press found that it ranked at the bottom of Americans’ list of public policy priorities.⁴⁴

Fewer still are focused on how climate change will affect the world’s poor. And neither climate change nor poverty alleviation has been a top-tier political issue in most developed countries, in the sense that few voters choose their elected leaders based on these factors. The suffering of distant strangers and future generations are at a disadvantage when competing with countless “kitchen table” issues that are more concretely felt in voters’ lives.

As a result, and because the costs of climate solutions are front-loaded, many politicians perceive leadership on this front as a losing issue. Yet polls suggest that these concerns may be exaggerated. According to WorldPublicOpinion.org, “Large majorities around the world support taking action to address the problem of global warming. More often than not, majorities favor taking major steps, urgently.” This does not mean that global publics are demanding action; but they are open to being asked—in particular, on questions of mitigation, where they indicate a willingness to



Photo by Alex Irvin

“We must invest our core energies in promoting governance, democracy, empowerment, and consciousness building. For if we do not draw people into the climate and development struggles, we have lost. Strengthening civil society can actually ensure that we broaden the base of those who see themselves as climate justice advocates.”

— Kumi Naidoo

Honorary President, CIVICUS: World Alliance for Citizen Participation; Co-Chair, Global Call to Action Against Poverty



Photo by Alex Irvin

“There is a palpable need for greater alignment, increased coherence, and perhaps even a new vocabulary that binds the climate change and development communities. An inclusive alliance for climate justice could help to both bring about this alignment and also increase the sense of urgency by giving a human face to climate-induced impacts.”

— **Mary Robinson**
President, Realizing Rights: The Ethical Globalization Initiative; Former President of Ireland

pay a higher price for energy, especially if that tax is put toward energy efficiency and cleaner fuels.

Significant climate action campaigns are under way in several countries, including in the United States through the Alliance for Climate Protection—a nonprofit, nonpartisan organization founded by Al Gore that aims to “persuade people of the importance, urgency and feasibility of adopting and implementing effective and comprehensive solutions for the climate crisis.” However, the alliance’s focus is on reducing greenhouse gas emissions—nationally and internationally—rather than on shoring up climate resilience in poor countries around the world.

Rallying support for adaptation will add another layer of difficulty and complexity. Yet the development community’s experience shows that the hurdles are not insurmountable. Through hard-fought campaigns on thorny issues like debt relief and trade, development activists have learned important lessons about galvanizing global support. They have also been successful in turning public aspiration into policy action—from the Jubilee 2000 debt relief campaign to the Make Trade Fair campaign. And working together, the climate change and development communities may find that their influence is greater than the sum of their parts, as they energize new actors across society—from the public health community to foresters.

Seven elements will be crucial for a successful global campaign to mobilize the public. First, this campaign will need to define the problem in ways that ordinary people can understand. Until recently, the climate change debate has seemed highly technical and scientific—swirling around ever-changing assessments of atmospheric concentrations of invisible gases. But the climate and poverty crises are really about innocent children in Somalia, hungry families in India, unemployed youth in Afghanistan, and vulnerable girls in refugee camps in Chad. To mobilize the public, the climate change–poverty crisis must have a human face.

Second, the campaign needs to connect the problems of climate change and development to target audiences by making them local and personal. This means accentuating the moral dimension of the need for urgent action. It also means showing how inaction could create prob-

lems that hit close to home—by exacerbating local vulnerability to climate change, and by intensifying global instability.

Third, while maintaining a sense of urgency, the campaign must demonstrate a clear pathway to success—including actions individual citizens can take. Without the promise of easily understood near-term solutions, the threat of catastrophe creates resignation and despair. Just as climate change–poverty suffering must have a human face, so too must its remedy: our own.

Fourth, the campaign must do more than merely refine the message; it must also get the word out. In developing countries, this will require greater expertise among journalists and media outlets in covering stories about climate vulnerability and related development solutions.

Fifth, the campaign needs to create a broad political coalition for action. Success will not come as long as climate change and global development are viewed as the purview of elites and special interests. And by the same token, it will be important for standard-bearers to be seen as “walking the talk” themselves. When the UN secretary-general, Ban Ki-moon, turned up the United Nations’ thermostat five degrees in the summer of 2008, the media took notice.

Sixth, the campaign must engage the private sector by creating credible opportunities for profit. Harnessing the energy and influence of entrepreneurs is essential not only for changing policy but also for changing societal behaviors. Experience has shown that consumers are willing to express their values in the way they spend their money, and to use their purchasing power to become active campaigners themselves.

Seventh and finally, the campaign must overcome the North–South divide by fusing the priorities of the North (climate change mitigation and environmental protection) with those of the South (equitable development and poverty alleviation). We must reimagine the climate change and development crises as a single global challenge that unites the world in the quest to alleviate human suffering and protect the planet for future generations.⁴⁵

Forging Multistakeholder Alliances for Climate Resilience

Building multistakeholder alliances between the private sector and civil society organizations will be critical in propelling policymakers into action, mobilizing resources, and stimulating research for climate change adaptation and mitigation. From BP and Intel to Coca Cola and Cargill, there are now thousands of examples of corporations joining forces with environmental and development NGOs, universities and think tanks, and bilateral and multilateral agencies to form cross-sector alliances for climate change mitigation. According to the Harvard University scholar Jane Nelson, these initiatives present win-win opportunities for both the public and private sectors in that they leverage greater resources, build capacity, deliver base-of-the-pyramid solutions, and enhance corporate performance. The advantages for each participating party are immense. And their value as advocates for the climate change and global development community could be catalytic.

Examples abound with clear climate change mitigation objectives. The Greenhouse Gas Protocol is but one example. This protocol, developed by the World Business Council for Sustainable Development and the World Resources Institute, is an international standard for greenhouse gas accounting and reporting used widely throughout the world.

So far, fewer corporate-led coalitions have united around climate change adaptation. Those that have made inroads are multisector alliances that advance triple-win opportunities in the forestry sector by curbing greenhouse gas emissions, bolstering resilience, and supporting local community development. For example, the Climate, Community, and Biodiversity Alliance (CCBA) seeks to leverage the carbon market to support forestry projects around the globe that promote this triple bottom line. In establishing a set of standards based on fifteen required criteria that evaluate the climate, community, and biodiversity impacts of land-based climate change mitigation projects, this cross-sector alliance has pioneered a tool that offers immense benefits to multiple sectors and achieves multiple development and climate ends. Currently, several dozen projects across both the developed and developing worlds are using the standards to improve

project design, while a number of governments—including China's—are using the standards as an effective means to guide sustainable forestry initiatives.

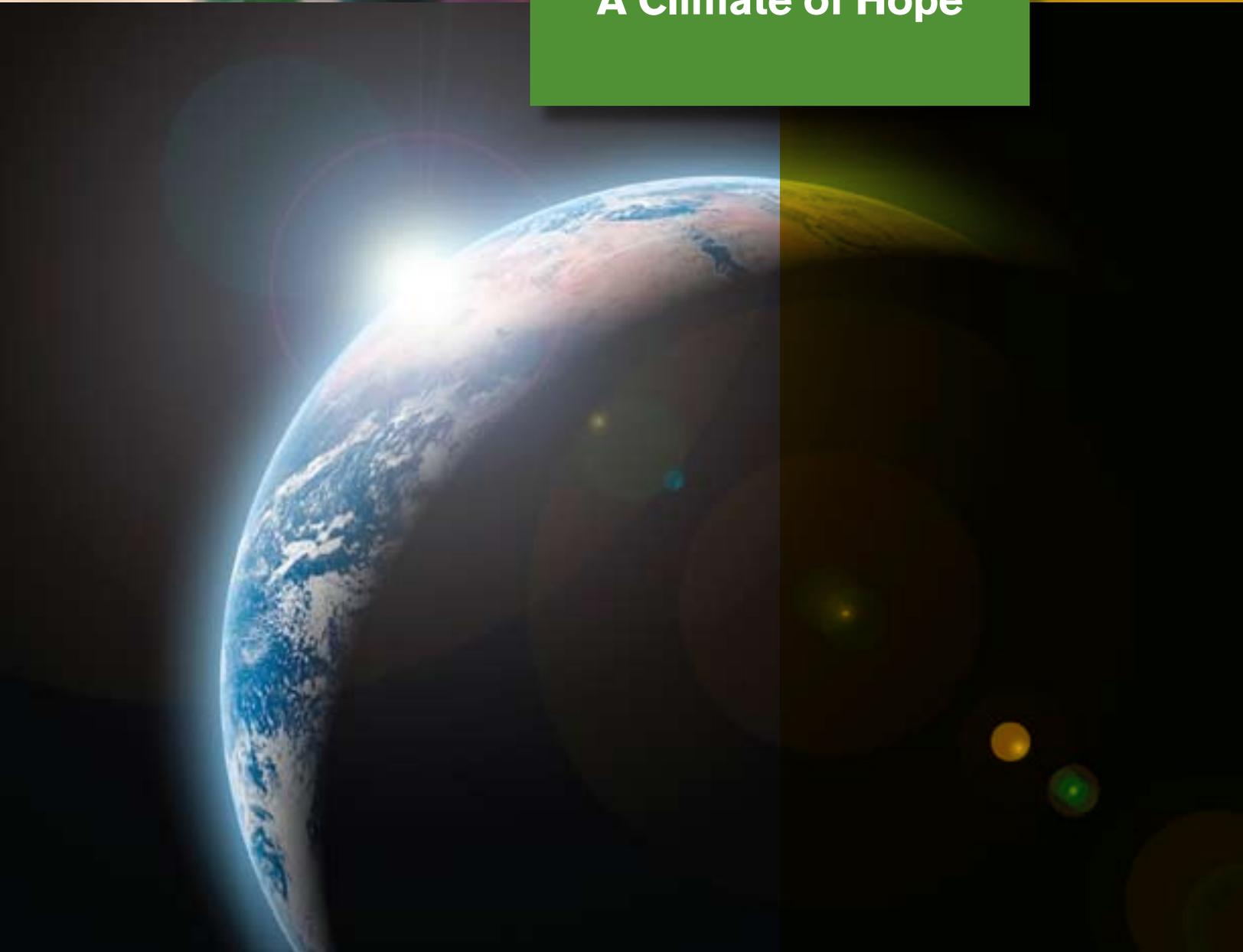
As an advocate, the CCBA is working to foster the creation of a mandatory carbon market that compensates forest protection and restoration initiatives around the world, promoting triple-win opportunities (for more information, see www.climate-standards.org/index.html). Another example is the Prince's Rainforests Project, a partnership of sixteen corporations and the Cambridge University Program for Industry established by Charles, Prince of Wales, in 2007. This initiative works alongside multilateral organizations to incentivize conservation at the national and local levels, and with the media to raise public awareness about deforestation and climate change.

A number of existing coalitions with traditional development mandates could be enlisted to raise the banner for climate change adaptation. For example, the Roll Back Malaria (RBM) Partnership works to enable the sustained delivery and use of effective treatment for those affected by malaria. With climate change expected to increase the incidence and geographic range of malaria, the RBM Partnership could become a leading advocate for climate resilience. Other multistakeholder alliances like the Global Alliance on Improved Nutrition and the Global Water Challenge could face similar setbacks. Sounding a louder public alarm through development-oriented coalitions regarding the importance of climate change resilience will be critical in building a powerful constituency for adaptation. The corporate community has too much at stake. For as the adverse effects of climate change unfold, businesses, markets, and economies will likely be affected and could potentially be destabilized all across the world.





A Climate of Hope



When it comes to climate change and development, the world has three choices: mitigate, adapt, or suffer.

Climate change has already progressed to the point where every society must engage in some adaptation and, regrettably, much suffering. Yet right now—for one brief, final moment—humanity still has the power to decide on the balance among these three. Unfairly, those who did the least to contribute to climate change have the smallest say in how the future will unfold, the least capacity to adjust to its outcome, and, by a cruel curse of geography and development, the biggest risk of losing everything.

So far, the global course of action has been shortsighted and self-defeating—neither mitigation nor adaptation. The United States in particular has failed to show either national or global leadership. But that can change. This report has sought to reveal just how much could be done to turn the challenge of climate change into opportunities for sustainable development. By promoting clean energy technologies and sound tropical forestry, we can involve the poor in an urgent global effort to mitigate greenhouse gas emissions, and we can do so in ways that improve livelihoods while reducing climate vulnerability. We can weave climate change into the fabric of development to avoid maladaptation and to enable the poor to become more resilient. With planning

and forethought, we can minimize the impact of inevitable natural disasters. We can marshal public and private financial resources to help the poor adapt to climate change and pursue sustainable development.

Our success will depend on educating and mobilizing the public around the world—and turning the climate threat into an “action multiplier” that catalyzes progress on many fronts. This is indeed a defining challenge—but also an opportunity. For as the *Human Development Report 2007/2008* reminds us,

We live today in a world that is divided at many levels. People are separated by vast gulfs in wealth and opportunity. In many regions, rival nationalisms are a source of conflict. All too often, religious, cultural and ethnic identity are treated as a source of division and difference from others. In the face of all these differences, climate change provides a potent reminder of the one thing that we share in common. It is called planet Earth. All nations and all people share the same atmosphere. And we only have one.⁴⁶



Photo by Alex Irvin

“We are on the cusp of a new era in human history when we conceive of ourselves as a single global civilization facing a single common threat. To galvanize a global consciousness on the road to solving the climate crisis will give us two reasons well worth celebrating.”

— Al Gore
*Chairman, Alliance for Climate Protection;
Former Vice President of the United States*



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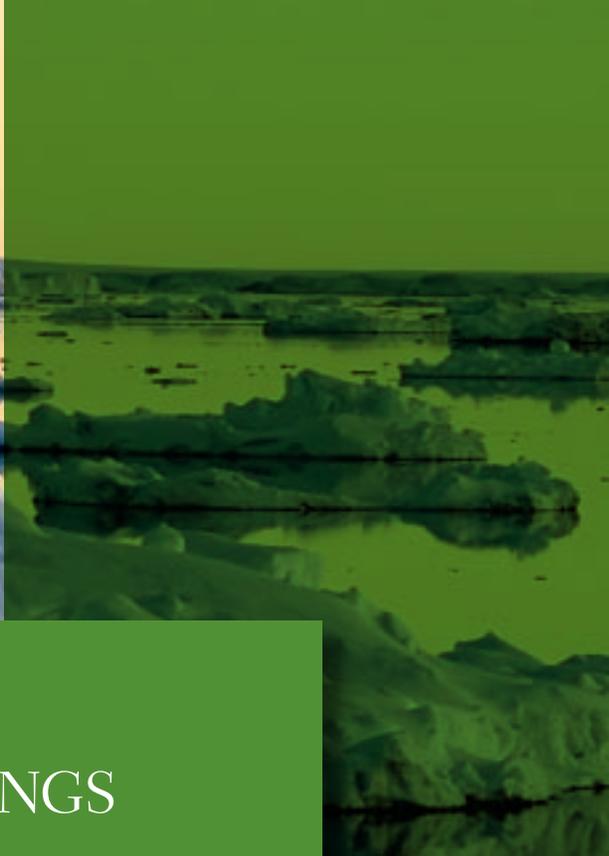
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Notes

- Maximilian Auffhammer and Richard Carson, "Forecasting the path of China's CO₂ emissions using province-level information," *Journal of Environmental Economics and Management*, 55, 3 (May 2008).
- Steven Mufson, "Power-Sector Emissions of China to Top U.S.," *Washington Post*, August 27, 2008.
- World Bank, *Global Monitoring Report 2008* (http://siteresources.worldbank.org/INTGLOMONREP2008/Resources/4737994-1207342962709/8944_Web_PDF.pdf [December 2008]).
- United Nations Development Program, *Human Development Report 2007/2008: Fighting Climate Change—Human Solidarity in a Divided World* (New York: United Nations Development Program, 2007) (http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf [December 2008]), 27–30.
- M. Boko, I. Niang, A. Nyong, C. Vogel, A. Githeko, M. Medany, B. Osman-Elasha, R. Tabo, and P. Yanda, "2007: Africa" in *Climate Change 2007: Impacts, Adaptation and Vulnerability—Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. M. M. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, and C. E. Hanson (Cambridge UP, 2007), 433–67.
- Smita Nakhoata, "Correcting the World's Greatest Market Failure: Climate Change and the Multilateral Development Banks," World Resources Institute, June 2008.
- Shardul Agrawala and Florence Crick, "OECD Guidance on Integrating Adaptation into Development Co-operation," presentation in Bonn, June 2, 2008.
- Heather McGray, Anne Hammill, Rob Bradley, E. Lisa Schipper, and Jo-Ellen Parry, *Weathering the Storm: Options for Framing Adaptation and Development* (Washington: World Resources Institute, 2007), 22.
- Manish Bapna and Heather McGray, "Financing Adaptation: Opportunities for Innovation and Experimentation," in *Climate Change and Global Poverty: A Billion Lives in the Balance?* ed. Lael Brainard, Abigail Jones, and Nigel Purvis (Brookings, forthcoming).
- These United Nations figures probably underestimate emissions from the forest sector because they do not account for forest degradation—such as the conversion of a rich primary forest into less vegetated, sparsely wooded ecosystem.
- UN Food and Agriculture Organization, *Annual Report on Forests* (Rome: UN Food and Agriculture Organization, 2006).
- Rhett A. Butler, "Deforestation Threats from Humankind," *Mongabay.com* / A Place Out of Time: Tropical Rainforests and the Perils They Face (<http://rainforests.mongabay.com/0803.htm> [December 2008]); Helmut J. Geist and Eric F. Lambin, *What Drives Tropical Deforestation: A Meta-Analysis of Proximate and Underlying Causes of Deforestation Based on Subnational Case Study Evidence*, LUCC Report Series 4 (Louvain-la-Neuve: Land Use and Cover Change International Project Office, 2001).
- The Stern Review estimates a cost of \$2 per ton of carbon dioxide (tCO₂). The Intergovernmental Panel on Climate Change (G.J. Nabuurs, O. Masera, K. Andrasko, P. Benitez-Ponce, R. Boer, M. Dutschke, E. Elsidig, J. Ford-Robertson, P. Frumhoff, T. Karjalainen, O. Krankina, W.A. Kurz, M. Matsumoto, W. Oyhantcabal, N.H. Ravindranath, M.J. Sanz Sanchez, and X. Zhang, "2007: Forestry," in *Climate Change 2007: Mitigation—Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, and L.A. Meyer (Cambridge UP, 2007), 541–584) predicts reducing carbon emissions from deforestation will be more costly and estimates that at least 50 percent of emissions from deforestation could be mitigated for less than \$100 per tCO₂. The World Bank believes the opportunity cost of forest conservation is under \$5 per tCO₂ in several major developing countries; Kenneth M. Chomitz, *At Loggerheads? Agricultural Expansion, Poverty Reduction, and Environment in the Tropical Forests* (Washington: World Bank, 2007). The variation is attributable to technical differences in underlying modeling assumptions.
- Katherine Hamilton, Milo Sjardin, Thomas Marcello, and Gordon Xu, "Forging a Frontier: State of the Voluntary Carbon Markets 2008," *Ecosystem Marketplace and New Carbon Finance*, May 8, 2008; Karan Capoor and Philippe Ambrosi, *State and Trends of the Carbon Market 2008* (Washington: World Bank, 2008).
- G. E. Kinderman, M. Obersteiner, E. Rametsteiner, and I. McCallum, "Predicting the Deforestation Trend under Different Carbon Prices," *Carbon Balance and Management* 1, no. 15: 1–17. For an analysis by N. Purvis et al. on the likely geography of forest carbon asset supply, also see www.forestcarbonindex.org.
- See The Nature Conservancy, "Climate Change: Voluntary Carbon Offsets, Meeting the Highest Standards" (www.nature.org/initiatives/climatechange/activities/art24030.html [December 2008]).
- Forest Trends, "New Report: Forest Communities and Indigenous Peoples Outpace National Governments and International Donors in Conserving World's Forests," July 22, 2004.
- World Bank, *World Development Report 2008: Agriculture for Development* (Washington: World Bank, 2008) (http://siteresources.worldbank.org/INTWDR2008/Resources/WDR_00_book.pdf [December 2008]).
- Robert Mendelsohn, "Development in the Balance: Agriculture and Water," in *Climate Change and Global Poverty*, ed. Brainard, Jones, and Purvis.
- Ibid.
- U. Confalonieri, B. Menne, R. Akhtar, K. L. Ebi, M. Hauengue, R. S. Kovats, B. Revich, and A. Woodward, "2007: Human Health," in *Climate Change 2007*, ed. Parry et al., 406.
- World Health Organization, *Protecting Health from Climate Change, WHO Report for World Health Day 2008* (Geneva: World Health Organization, 2008) (www.who.int/world-health-day/toolkit/report_web.pdf [December 2008]), 7.
- Kristie Ebi, "The Adaptation of Public Health to Climate Change in Low-Income Countries," in *Climate Change and Global Poverty*, ed. Brainard, Jones and Purvis.
- World Health Organization, *Protecting Health from Climate Change, WHO Report for World Health Day 2008*, 7.
- Ibid., 22.
- Thomas Fingar, "National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030," House Permanent Select Committee on Intelligence, House Select Committee on Energy Independence and Global Warming, June 25, 2008.
- CNA Corporation, "National Security and the Threat of Climate Change," April 2007, 18.
- See Nigel Purvis, "U.S. Global Leadership to Safeguard Our Climate, Security, and Economy," Better World Campaign, 2008, 7.
- For more information, see www.rockfound.org/initiatives/climate/climate_change.shtml.

30. For more information, see <http://gfdrr.org/index.cfm?Page=home&ItemID=200>.
31. John Podesta and Peter Ogden, "Global Warming: The Security Challenges of Climate Change," Center for American Progress, November 2007, 25.
32. United Nations Development Program, *Human Development Report 2007/2008*, 192–94.
33. See United Nations Development Program, *Human Development Report 2007/2008*, 15, 194; and for the cost of the Iraq War, see <http://thinkprogress.org/2008/07/25/iraq-war-cost/>.
34. United Nations Development Program, *Human Development Report 2007/2008*, 43–44.
35. Bapna and McGray, "Financing Adaptation."
36. Benito Müller, "International Adaptation Finance: The Need for an Innovative and Strategic Approach," Oxford Institute for Energy Studies, June 2008, 7, 8.
37. Bapna and McGray, "Financing Adaptation."
38. Müller, "International Adaptation Finance."
39. United Nations Development Program, *Human Development Report 2007/2008*, 195.
40. This figure includes blended resources for mitigation and adaptation, including the Adaptation Fund, the Least Developed Countries Fund, the Special Climate Change Fund, the Global Environment Facility Trust Fund's Strategic Priority to Pilot an Operational Approach on Adaptation, the Global Facility for Disaster Reduction and Recovery, the United Nations Development Program Adaptation Facilities for Africa, the Clean Technology Fund, the Strategic Climate Fund, the Thematic Program for Environment and Sustainable Management of Natural Resources Including Energy, and the European Development Fund. See "Annex 2-Costs and Financing Sources," in "Development and Climate Change: A Strategic Framework for the World Bank Group," World Bank, September 30, 2008.
41. International Monetary Fund, "Poverty Reduction Strategy Papers Fact Sheet," April 2008 (www.imf.org/external/np/exr/facts/prsp.htm [May 2008]).
42. Magali Rheault, "Africans May Be Noticing the Effects of Climate Change," Gallup Poll, December 2, 2007.
43. This figure does not include host-country journalists, who made up 25 percent of those registered. James Fahn, "Rescuing Reporting in the Global South," *Nature Reports Climate Change*, vol. 2, July 2008.
44. Pew Research Center for the People and the Press, "A Deeper Partisan Divide Over Global Warming," Summary of Findings, May 8, 2008.
45. Heather Kaplan, Raymond Offenheiser, and David Waskow, "Mobilizing Action for Climate Change Adaptation in the North and South," in *Climate Change and Global Poverty*, ed. Brainard, Jones, and Purvis.
46. United Nations Development Program, *Human Development Report 2007/2008*, 2.





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