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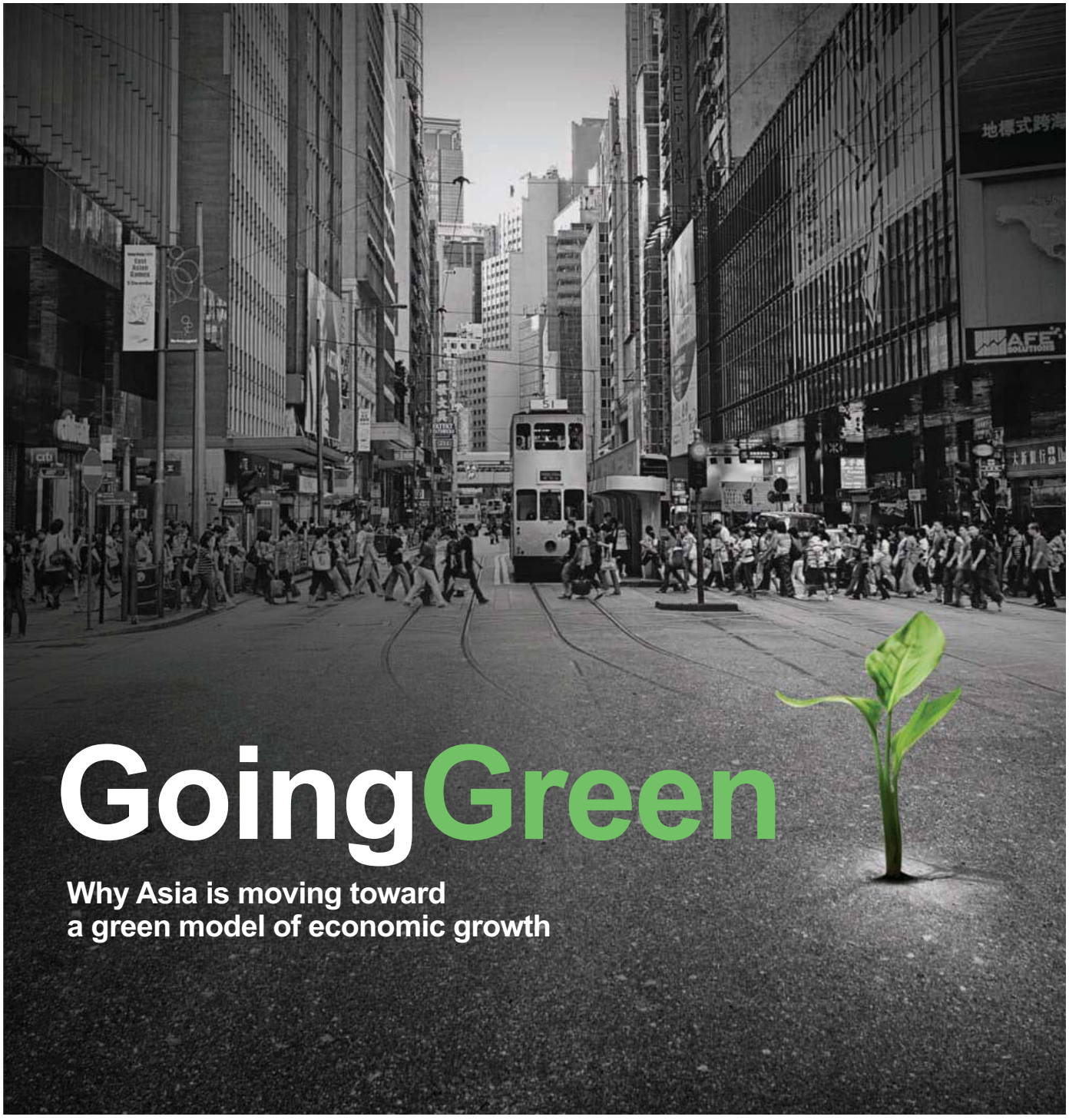
January–March 2012

Also in this edition...

- *Ashok Khosla on the limits to infinite growth*
- *Why greed is good for development*
- *How soda can save lives*



Going Green

Why Asia is moving toward a green model of economic growth

Some solutions for climate change are blowing in the wind

Climate change makes us all vulnerable. But one sure way to fight it is to harness renewable energy. ADB provides funding and assistance for wind energy facilities across Asia. These facilities turn wind into electricity. Provide power for tens of thousands of poor households. And switch Asia on to a low carbon growth path.

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The Green Imperative

Developed countries and developing countries have always had differing views on the environment. Many of the world's wealthiest countries have made their economies much more environmentally friendly. And they want developing countries to do the same. The developing world has responded that wealthy countries became rich by exploiting natural resources with little regard for the environment. As they struggle to expand their economies, and lift their people out of poverty, developing countries are being held to an environmental standard that rich countries never had to follow.

This edition of *Development Asia* explores what many feel is the best solution to this divide. In our cover story, longtime Asia-based journalist and author Gregg Jones looks at the concept of green growth: the embracing of environmentally sound and sustainable policies with the need to maintain high economic growth.

In an exclusive interview, Ashok Khosla, one of the world's leading experts on the environment and sustainable development, takes a hard, no-holds-barred look at the promises and failings of green growth.

As part of this theme, the economics of biodiversity—the monetary value of a country's natural resources—is examined. Other stories in the cover package look at water and air pollution, and the growing problem of hazardous waste in the region.

In the Articles section, an intriguing question is asked: Why in some of the most remote places in the world, where people cannot find clean water or simple medicine, can you still buy a cold Coca-Cola? The answer is that the multinational soft drink company has one of the world's best distribution systems. One organization wants to use that system to get medicine and other essential supplies to some of the world's neediest people.

Other stories include an interview by regular contributor Jade Lee-Duffy with Annie Duflo, one of the bright young stars in the world of aid effectiveness research.

We hope this edition inspires you to look at the environment around you and do your part to improve it. As always, your thoughts and comments are welcome at **editor@development.asia.** ■

Ann Quon
Publisher

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Contributors

Mark Blackwell has more than 20 years of experience covering issues ranging from science and economics to politics and international affairs for news organizations, including the Hearst Corporation and Capital Cities/ABC. He specializes in information graphics.

William Branigin served as Southeast Asia bureau chief of *The Washington Post* for 10 years, reporting from more than a dozen countries in the region. He was based in Bangkok from 1981 to 1986 and in Manila from 1990 to 1995.

Jade Lee-Duffy has worked as a journalist in Hong Kong for more than 10 years, covering education, property, the arts, food, and health issues. She is a regular contributor to the *South China Morning Post.*

Karen Emmons is a Bangkok-based journalist who writes on public health and social issues.

Gregg Jones was a correspondent in Asia for 10 years, covering development issues, civil wars and other subjects. He is the author of the upcoming book *Honor in the Dust: Theodore Roosevelt, War in the Philippines, and the Rise and Fall of America's Imperial Dream.*

Andrew Marshall is a Bangkok-based journalist and the author of *The Trouser People,* a political travelogue about Myanmar.

Floyd Whaley covers the Philippines for the *International Herald Tribune* and T*he New York Times*. He is the senior editor of *Development Asia* and operates Asia Editorial Services.

Blame Game

"Human activity has caused profound changes to the climate, biodiversity, oceanic acidity and greenhouse-gas levels in the atmosphere. But it does not automatically follow that the more people there are, the worse the damage. In 2007 Americans and Australians emitted almost 20 tonnes of carbon dioxide each. In contrast, more than 60 countries—including the vast majority of African ones—emitted less than 1 tonne per person…. Global pollution will be more affected by the pattern of economic growth—and especially whether emerging nations become as energy-intensive as America, Australia and [the People's Republic of] China." —*The Economist, 22 October 2011*

A Bright Idea

"While switching to compact fluorescent bulbs—75% more efficient than incandescents—has become unremarkable in some developed nations, the significance of [the People's Republic of] China's move should not be underestimated…. With [the PRC] churning out billions of efficient bulbs, costs will fall. That means it will be possible to cut carbon emissions from lighting around the world without denying the most basic of amenities to the world's poor." —*Damian Carrington's Environment Blog, The Guardian, 5 November 2011*

Private Money for the Public Good

"Private foundations have emerged as increasingly potent players in the fight against poverty alongside official development aid. According to a Hudson Institute report, total official development assistance was $120 billion in 2009, while global philanthropy amounted to $53 billion. Private capital investment ($228 billion) forms the largest financial flow from richer to poorer countries, while remittances ($174 billion) were the second-largest flow." —*The Guardian, 9 November 2011*

Dirty Recovery

"Analysis by the PricewaterhouseCoopers Low Carbon Economy Index shows that during the recession, many countries including Britain saw emissions fall faster than gross domestic product, a measure of the total economy, because their manufacturing output fell. But in 2010, global GDP growth was just above 5%, while emissions rose by nearly 6%." —*Daily Telegraph, 7 November 2011*

Consumption Trumps Growth

"As the UN report points out: 'Considerable population growth continues today because of the high numbers of births in the 1950s and 1960s, which have resulted in larger base populations with millions of young people reaching their reproductive years over succeeding generations…' Yes, population growth contributes to environmental problems. No, it is not the decisive factor. Even the availability of grain is affected more by rising livestock numbers and the use of biofuels—driven, again by consumption—than by human population growth." —*George Monbiot's Blog, The Guardian, 27 October 2011*

Get Used to High Prices

"Catastrophic flooding and crop losses in Thailand, the world's leading rice exporter, are raising concerns that another food crisis may be in the offing. Also disquieting is the possibility that the world may have already entered a new era where persistently high food prices are the 'New Normal.' At a time when policymakers are grappling with a host of thorny economic issues, the possibility may be unwelcome, but must not be ignored." —*Asian Development Bank's Iwan J. Azis in an opinion piece for The Japan Times, 7 November 2011*

Signs of the Times

"Any economic model that does not properly address inequality will eventually face a crisis of legitimacy. Unless the relative economic roles of the market and the state are rebalanced, the protests of 2011 will become more severe, with social and political instability eventually harming long-term economic growth and welfare." —*Economist Nouriel Roubini, writing for Project Syndicate in October 2011*

Good as Cash

"Vouchers solve many of the serious problems that have always plagued in-kind food aid…. [And] Aid is multiplied as it helps not only recipients, but merchants." —*The New York Times, 3 November 2011*

What's Your Footprint?

Global Footprint Network

http://www.footprintnetwork.org

How much of an impact does your lifestyle make on Earth? How much land area does it take to support your consumption? Global Footprint Network has made this a personal question with a quiz on their website that gives users an estimate of their ecological footprint.

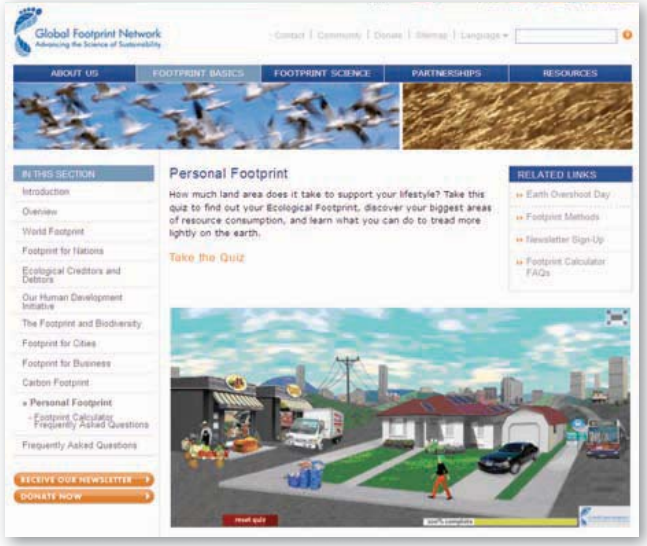
The website walks users through a variety of questions, such as how often they eat meat, how they heat their home, and how often they take the train. After answering the questions, a report card on the user's impact on the earth is provided. It includes such admonitions as: "If everyone lived the same lifestyle as you, we would require the regenerative capacity of 1.6 planets each year" and "to support your lifestyle, it takes 2.8 hectares of the earth's productive area."

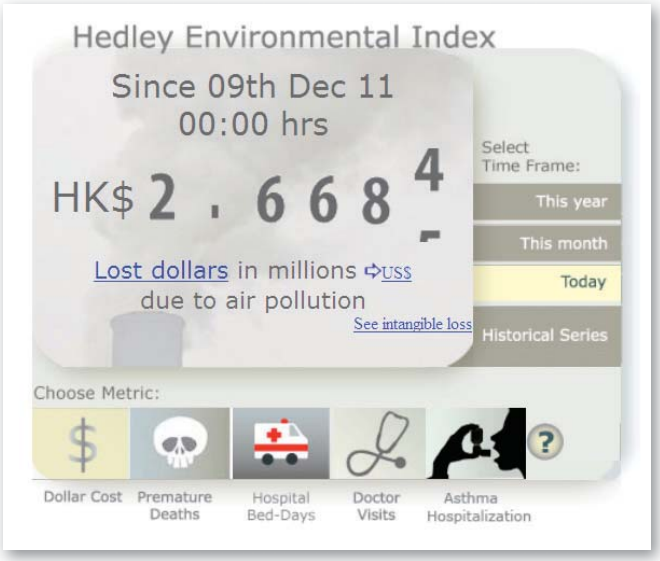
Although the science behind such a quiz might be questionable (the website provides a link that outlines its scientific basis), the impact on the user is significant. The mere answering of the questions forces users to contemplate how much they are consuming and the impact it is having.

At the end of the quiz, a link is provided to assess how users can lessen their ecological footprint, which after all is the whole point of the exercise. For now, the quiz is only offered in Asia for residents of the People's Republic of China, India, and Japan; but work is underway to add more countries.

The quiz is a clever aspect of attempts by the nonprofit organization, Global Footprint Network, to develop a standardized method of measuring human impact on the earth. The group seeks to develop ecological footprint report cards for cities, companies, and individuals to be used as a tool to lessen the impact on the environment.

Their plan is ambitious, but it all starts by taking a quiz. ■





Reality

Hedley Environmental Index

http://hedleyindex.sph.hku.hk/home.php

Governments around Asia are grappling with how to monitor and respond to air pollution. Few have come up with estimates on how much poor air quality costs society.

The public policy think tank Civic Exchange, based in Hong Kong, China, has taken the initiative and hosts a website that has become an example of how to measure and illustrate the impact of air pollution.

The site publishes in real time the economic costs of Hong Kong, China's air pollution in terms of public health impacts and their monetary value. This includes premature deaths, hospital bed days, and doctor visits.

When users first land on the page, a spinning ticker tells them how many dollars have been lost due to air pollution in Hong Kong, China, since midnight. Click another button and it tells how many lives have been lost since January 1 (833 as of December 7). A daily check of the site is a sobering reminder of the impact of air pollution on society.

The site also includes an air quality tracking tool that allows users to compare current air quality to World Health Organization air quality guidelines in real time, or to compare historical records of good and bad air days. It includes a photo of the Hong Kong, China skyline that is updated every 15 minutes by the Hong Kong Observatory.

The index is the brainchild of Anthony Hedley, the chair of Community Medicine at the School of Public Health at Hong Kong University, and a team of researchers who have for decades worked on air-related health issues in Hong Kong, China; and southern People's Republic of China. ■

Researched and written by Floyd Whaley

Growing Green

Must developing Asia sacrifice its environment for economic prosperity? A growing number of political leaders think not

BY Gregg Jones

At the Boao Forum for Asia in the People's Republic of China (PRC) in 2010, some 2,000 political and business leaders from around the region applauded when PRC Vice-President Xi Jinping in his keynote address called for "green and sustainable development." His forward-thinking blueprint for future Asian development included the promotion of renewable energy and low-carbon technology, and efforts aimed at steeping Asians in the culture of conservation—ideals that were hardly priorities for most leaders in the region just a few years ago.

The nations of Asia and the Pacific have dazzled the world with their robust economic growth over the past 2 decades, reducing poverty rates and delivering middle-class comforts to millions. But the region has also become a leader in the unwelcome byproducts of traditional development: reduced water and air quality, depleted natural resources, and imperiled biodiversity.

That is beginning to change.

"Green growth" projects are sprouting around the region. The PRC, for years best known for its spectacular economic growth and spiraling environmental problems, has also become a leader in the development of green technologies. In 2009, the PRC overtook Denmark, Germany, Spain and the United States to become the

GREEN PATH Soft light illuminates a forest path in Bosung, Republic of Korea. The country has committed to investing 2% of its gross domestic product (GDP) in green growth.

world's top manufacturer of wind turbines, and its domestic market for turbines has already become the world's largest. The PRC also boasts the world's longest high-speed rail network, and holds close to 1,000 local and international patents for high-speed rail technologies.

Support for environmentally friendly growth isn't limited to Asia's economically powerful. At the Boao Forum in the PRC, former Philippine President Fidel Ramos urged Asian leaders to pursue a green recovery, even if it meant a painful transition for countries in the region. Mongolian Prime Minister Sukhbaataryn Batbold conceded that it would take decades to wean his country from its dependence on fossil fuels, but pledged to promote green strategies in mining, railways, and construction.

The talk was similarly bold in Seoul, Republic of Korea, in June last year at the Global Green Growth Summit hosted by the Government of the Republic of Korea and the Organisation for Economic Co-operation and Development. The theme of the gathering was "Building Planet-Responsible Civilization." High-level government officials, development experts, and other participants shared strategies for green growth and cross-border cooperation in the pursuit of sustainable economies. In his opening remarks, Lee Myung-bak, President of the Republic of Korea, set the tone by calling for technological advances essential to building green economies that won't threaten the prosperity of future generations.

"We can make changes," he said, "if we concentrate all our efforts on harmony between man and the Earth."

'VORACIOUS APPETITE'

Forward-thinkers in Asia have warned for years that the days of growth without regard for resource consumption or environmental costs could not continue. But the pressure to produce rising prosperity left those warnings largely unheeded. In 2005, Asia's voracious appetite for raw materials hit a world-leading 35 billion tons. That figure is on target to reach a staggering 80 billion tons by 2050. The region's soaring demand for energy is similarly insatiable: Asia and the Pacific's share of global energy demand spiked from about 20.5% in 1975 to about 35.6% in 2005, and it is projected to reach 50% by 2028, according to the United Nations Environment Programme (UNEP).

A recent Asian Development Bank (ADB) report, *Greening Growth in Asia and the Pacific*, laid out the harmful results of the region's rush to deliver economic growth. Developing countries in Asia and the Pacific found themselves "challenged by associated air and water pollution, degraded natural resources and threatened ecosystems, worsening water stress, natural disasters, and increased generation of wastes including hazardous waste." And the problems are being exacerbated by climate change.

"Anthropogenic climate change is a serious challenge to sustainability," notes the report. "It threatens not only the integrity of natural systems, but also the very fabric of economic and social systems, especially in the developing world. Among all the regions, Asia and the Pacific has the greatest number of people at risk from climate change impacts."

With populations throughout much of the region continuing to rise, the pressure to deliver economic progress isn't going to ease in the foreseeable future. Indeed, the political imperative to create more jobs, modernize infrastructure, and build new cities only promises to increase.

"The industrial transformation in Asia's developing economies, the rise in the material standard of living, and the reduction of poverty in many of these countries will require great amounts of natural resources and generate large quantities of emissions," says Achim Steiner, an under-secretary-general at the United Nations and executive director of UNEP. "Because resources are finite and the absorptive capacity of the Earth's ecosystems is limited, the aspirations of these nations will most likely be constrained by environmental factors."

Although rapidly growing countries in Asia are becoming more resource-efficient over time, they are still relatively less efficient than developed countries, says Nessim Ahmad, director of ADB's Environment and

ONE WORLD **Leaders from around the world will convene in June for the Earth Summit in Rio de Janeiro, Brazil.**

> **"The concepts of a green economy and green growth are now moving into the mainstream of global and regional policy discourse, not to mention national strategies."**
>
> **—Asian Development Bank President Haruhiko Kuroda**

PICTURE CREDIT: UN PHOTO/KIBAE PARK (REPUBLIC OF KOREA); NASA'S EARTH OBSERVATORY

WALL OF PROMISES **United States President George H. W. Bush signs the Earth pledge with his wife Barbara during the first United Nations-sponsored Earth Summit in Rio de Janeiro, Brazil in 1992, which set in motion the global drive for sustainable development.**

Safeguards Division. He notes that Asia's resource efficiency—using fewer resources per unit of gross domestic product—is a key factor in the region's sustainable development.

"In 2005, for instance, the PRC and India had material intensities of 9.2 and 6.84 kilograms per dollar of GDP, respectively, while Japan had a material intensity of under 0.30 kg per dollar of GDP. These existing efficiency gaps signal a tremendous opportunity for a region to adopt more resource-efficient production processes while pursuing growth," he says.

The challenge for Asia is to deliver economic gains while setting aside the growth-at-any-price development model. "Climate change and environmental sustainability are among the key challenges," Ahmad says. "The grow-now-clean-up-later approach will undermine the future growth and poverty reduction potential of the region."

The failure to change will cost the region dearly, experts warn.

"Asia cannot continue its current path of development, which is not sustainable," says Nay Htun, a former UN assistant secretary-general with considerable experience in development, environment, and energy issues. "The consequences include increasing inequities, poverty, social strife, retarding economic development and growth and worsening environmental quality, with serious effects on human health and well-being."

The UN's Steiner echoes that dire note. "Ultimately, the region's competitive viability will be governed by the speed and scale at which it adopts new industrial systems that use far less energy, materials, and water as well as its continued progress on achieving prosperity for the people," he says.

Those stark realities have attracted Asian policy makers to the idea of green development.

INTERDEPENDENT AND INSEPARABLE

It's hard to argue with the philosophy of green growth. As defined by UNEP, it increases income and employment, reduces carbon emissions and pollution, enhances energy and resource efficiency, and prevents the loss of biodiversity and ecosystem services.

The concept is a derivative of "sustainable development," an idea that arose in the 1980s with the belief that economic advancement around the world had to proceed in greater harmony with the natural environment. A 1987 report by the UN-backed World Commission on Environment and Development made the case for the interdependence of economic development and the environment. "The environment does not exist as a sphere separate from human actions, ambitions, and needs, and therefore it should not be considered in isolation from human concerns," a summary of the report states. "The environment is where we all live; and development is what we all do in attempting to improve our lot within that abode. The two are inseparable."

The idea gained critical mass in June 1992 when delegates from around the world convened in Rio de Janeiro, Brazil, for the first UN Conference on Environment and Development. The Agenda 21 action plan adopted by the conference called on nations to adopt a model of sustainable development in their pursuit of social and economic advancement in the 21st century. A year later, the UN established the Commission on Sustainable Development to oversee implementation of the agenda adopted at Rio.

Ten years after the Rio gathering, the World Summit on Sustainable Development convened in Johannesburg, South Africa, to reinvigorate the efforts set in motion in Brazil.

Over the past decade, the concept has undergone subtle refinements, giving rise to a philosophy that places greater emphasis on growth rather than sacrificing development ambitions to save the environment. It's a critical distinction for policy makers in Asia

PICTURE CREDIT: AFP

and other developing regions of the world.

"The concepts of a green economy and green growth are now moving into the mainstream of global and regional policy discourse, not to mention national strategies," said ADB President Haruhiko Kuroda in a recent speech.

"It is about finding ways for countries to grow more sustainably. It seeks to create jobs and new sources of economic advancement based on the development and deployment of clean technologies that curb pollution, conserve our ecosystems, and prevent resource depletion."

The campaign for green growth will mark another milestone at a propitious moment in 2012, when delegates from around the world return to Rio for the UN Conference on Sustainable Development.

LEADING THE WAY

At Rio, representatives of Asia and the Pacific will be able to point to substantial progress in several areas critical to green growth: energy conservation and renewable energy development, pollution mitigation, expansion of clean mass transit systems, improved urban planning, and preservation of natural resources.

"Reshaping and refocusing policies and investments can lead to better returns on natural, human, and economic capital," says Steiner. "UNEP is already working with many countries in the region to make the transition to a sustainable development model, which is still the overarching goal."

He cites three countries in Asia that are making progress on this front.

- The Republic of Korea has promoted the efficient use of resources, waste prevention and resource reutilization, extended producer responsibility, and recycling since the early 1990s. In 2008, it developed a national strategy and action plan for low carbon green growth. More recently, it has launched the Green New Deal Policy to invest 2% of its GDP in green growth and created the Global Green Growth Institute in Seoul.
- Japan has pioneered resource efficiency and recycling with its Fundamental Law and Plan for Establishing a Sound Material-Cycle Society, which was adopted in 2000, and its Law on Promoting Green Purchasing, enacted in the same year. Numerous initiatives have followed.
- The PRC has launched a series of green growth initiatives, beginning with a 2002 law promoting cleaner production, its Solid Waste Act (amended in 2004), and its Circular Economy Law in 2008, which promotes improved resource utilization and reduction, reuse, and recycling of resources during production. The PRC also recently adopted a green development plan as part of its 12th Five-Year Plan.

Steiner notes other important initiatives underway around the region: Indonesia's efforts to phase out fossil fuels and reduce deforestation, Thailand's initiative on clean technology, Viet Nam's policies on energy tariffs and subsidy reforms, India's Rural Employment Guarantee Act and Clean Energy Fund, and Bhutan's Gross National Happiness indices as part of a redefinition of wealth and economic progress.

"In my opinion, leadership and vision have been fundamental to the development of such green initiatives and the political leaders of Asia–Pacific should be congratulated for recognizing the need to change and taking steps toward greener and more sustainable development," says Steiner. "At the same time, the industrial and business sectors, civil society organizations, and ordinary people are all making an important contribution."

While working to achieve better environmental balance in its development efforts, the PRC has also been a leader in tapping the profit

RECYCLING PIONEER A TV set is placed on a disassembly line in Japan where workers dismantle the appliance and remove parts that may be recycled. Japan has pioneered resource efficiency and recycling with its Fundamental Law and Plan for Establishing a Sound Material-Cycle Society in 2000.

potential of the shift to low-carbon, green technologies—a fact underscored by the PRC's rapid emergence as the leading world supplier of wind turbines and high-speed rail technology. In 2008, the PRC earned more than $60 billion—1.4% of its GDP—from green technology business activities.

The recent financial crisis has not slowed the gathering momentum for green growth in Asia. In fact, the 2008–2009 crisis was an impetus for clean growth. Australia, the PRC, Japan, and the Republic of Korea have been singled out for praise by green growth advocates for devoting significant portions of economic stimulus funds during the crisis to green growth and clean technology investments.

"While countries across the globe are now rethinking their economies and patterns of development in order to minimize the kinds of shocks and wildly oscillating commodity prices that we have recently witnessed, one lesson learned from the crisis was that countries should not rely solely on exports for growth," says Steiner. "As a result, there has been a shift in the region toward domestic consumption as a driver of growth. Opportunities, therefore, lie in the deployment of green technologies more widely within Asia, rather than emphasizing exclusively external markets for these products."

Nay Htun notes that green initiatives have been launched not just by governments, but also by nongovernment organizations and the private sector in Asia and the Pacific.

"Universities, too, are greening their campuses and curricula," says the former UN official who is currently research professor at Stony Brook University in New York. "Japan, [the People's Republic of] China, and [Republic of] Korea have major green programs." In Japan, the Fukushima earthquake and nuclear disaster "has energized the government, business, and industry, and, importantly, the general public to go 'green' very proactively and extensively."

In another sign of the changing attitudes within the private sector, a major industrial and residential estate developer in Indonesia, PT Jababeka Terbuka, now advertises environmental responsibility as a selling point to foreign corporations looking to relocate to the Southeast Asian country. It touts a pollution prevention program, the "3R concept (reduce, recycle, reuse) to lessen the negative impacts on the environment" and an energy-efficiency program "to reduce greenhouse gas emissions." Working with Indonesia's eminent environmentalist and sustainable development advocate, Emil Salim, the company has promoted tree planting and other green activities.

ADB, the UN, the World Bank, and other institutions have provided vital support to the green development efforts underway in the region. And this broad coalition of partners is what is needed in the future as well.

"A lot of progress has been made since the 1992 Conference on Environment and Development in Rio, and there is reason to be cautiously optimistic about what comes in the future," says Bindu Lohani, ADB vice-president for Knowledge Management and Sustainable Development.

"However, the challenges in achieving green growth remain numerous and varied," he says. "This highlights the need for coordinated action and knowledge sharing to promote environmentally sustainable growth in Asia and the Pacific."

CLEAN CATCH A man throws a fishing net over the Mekong River in Phnom Penh, Cambodia. Keeping water sources clean is one of the major issues facing Asia, which is under pressure to conserve this essential resource in the face of growing demand by fast-growing cities and industries.

PICTURE CREDIT: AFP

CARROT AND STICK APPROACH

Among those challenges are thorny governance and regulatory issues. Carbon-polluting fossil fuels remain heavily subsidized in many countries. In many cases, entrenched business and political interests and corruption obstruct green policy changes.

Proponents of green growth argue that ecological tax reform needs to take place to ensure equal treatment of traditional fuels and practices and clean technologies. They advocate the imposition of carbon taxes,

SHIFTING GEARS **A commuter rides past transmission towers in Beijing. Asia has made solid progress in reducing poverty. Yet, experts say the only way to achieve long-term prosperity is to minimize the impact on the environment by using less energy and resources.**

levies on the use of nonrenewable energy and virgin materials, and fees and charges on practices that pollute the environment or waste natural resources, and they call for tax breaks on production methods or consumption patterns that produce green outcomes. One example cited by green growth advocates is the PRC's substitution of a standard road tax with a fuel tax that encourages energy efficiency.

The key is a mix of market incentives and government regulation, experts say.

"Without a strong and credible compliance enforcement system, no incentives framework will deliver behavioral changes necessary to achieve green growth," says ADB's Ahmad. "For example, experiences in forest management show that a moratorium on logging backed up by incentives for sustainable management and protection can work better than either approach on its own."

The Asian Environmental Compliance and Enforcement Network, formed in 2005, has allowed environmental agency officials from around the region to compare notes as they attempt to enforce regulations and improve environmental compliance.

Another change that would facilitate greater acceptance of the green growth philosophy is a new approach to measuring economic performance, some experts say. The contention is that GDP needs to be adjusted to account for such factors as resource depletion and pollution.

UNEP's recent *Green Economy Report* notes that "a major challenge is reconciling the competing economic development aspirations of rich and poor countries in a world economy that is facing increasing climate change, energy insecurity, and ecological scarcity." It contends that this is possible through a green economy that offers "a development path that reduces carbon dependency, promotes resource and energy efficiency, and lessens environmental degradation. As economic growth and investments become less dependent on liquidating environmental assets and sacrificing environmental quality, both rich and poor countries can attain more sustainable economic development."

But forging a consensus between developing and developed countries on these issues may be the greatest challenge of all, says Indonesia's Salim, an economist and an environmentalist. He acknowledges that Indonesia can't sustain the depletion of natural resources caused by its mining and plantation-based economy. For Indonesia, the path to a greener economy would mean adding value to its exports, transforming copper, palm oil, and other raw products into more valuable finished goods. But, he says, Indonesia's efforts in this regard are being thwarted by the cost of foreign technology, and the higher tariffs that Indonesia's value-added products confront when exported to the US and other developed countries.

"That is an inequity in the way the global market works," he says, an inequity that is blocking Indonesia from moving faster toward a green economy and preserving its natural resources. "We can't solve this problem on our own."

Indonesia and other developing countries face a similar dilemma when confronted with outside pressure to shift from polluting fossil fuels to renewable energy sources, he says.

"The technology for renewable energy is expensive," he says. "When the government is confronted with the choice—food for the poor or technology for renewable energy—it will opt for food for the poor."

Indeed, throughout the region policy makers face the daunting challenge of delivering environmentally sustainable development while satisfying the economic demands of rapidly growing populations. The accelerating migration of rural dwellers to cities across Asia presents the region with unprecedented infrastructure demands. As Asia's cities swell by 44 million people each year, policy makers are faced with the staggering prospect of adding 20,000 urban dwellings, 250 kilometers of roads, and 6 million liters of potable water each day to meet the soaring demands.

While acknowledging the daunting challenge this presents,

> **"The technology for renewable energy is expensive. When the government is confronted with the choice—food for the poor or technology for renewable energy—it will opt for food for the poor"**
>
> **—Emil Salim, Indonesia's eminent environmentalist and sustainable development advocate**

ADB's Ahmad contends it is also a "great opportunity to design, build, and operate infrastructure on principles of sustainability, including accessibility, eco-efficiency, and social inclusiveness."

Complicating the enormous social and economic demands that the governments of Asia and the Pacific will confront in the coming decades are the mounting challenges posed by climate change. ADB is among those advocating "ecosystem-based approaches" to cope with the extreme effects of climate change. One such example is making additional efforts to protect mangroves rather than building sea walls as a buffer against increasingly violent storms—efforts that are not only cost-effective, but also preserve vital ecosystems and generate other economic and social benefits.

The political will of governments will be further tested as the transformation to a greener economy unfolds. As many as 50 million green jobs could be in Asia by 2025, the International Labour Organization estimates, but millions of others will be lost as the fossil fuel industry and other inefficient or low-technology sectors decline. This will require interim efforts to cushion the impact.

The transition to a sustainable economy in the region promises to be costly, but green growth advocates contend that delay or inaction is even more expensive. Environmental mitigation costs in developing countries will top $100 billion by 2030. Asia and Pacific alone faces annual costs estimated at $40 billion to adapt its economies to the demands of environmental sustainability—amounts far beyond the means of government budgets.

The key is using limited public sector funds to leverage far more significant amounts of private capital for green investments.

Global venture capital investments in clean technology soared from $2.0 billion in 2005 to $7.8 billion in 2010, but only about 10% of that amount has found its way to the region.

ADB has launched the Asia Climate Change and Clean Energy Venture Capital Initiative to increase that ratio. ADB aims to nurture the rise of clean technology companies in the region's developing countries by supplementing the investments of venture capital funds with equity infusions. The long-term goal is to stimulate the movement of venture capital toward climate change mitigation and clean energy investments in the region.

"Energy, urban development, transport, infrastructure, water, wastes, [and] biodiversity are all interconnected," says Nay Htun, the former UN official. "The pathway toward greening is an integrated and multisector, multidisciplinary approach. The major challenge is how to integrate. What are the policies, economic incentives, financial mechanisms, normative measures, technology? Asia's challenge, as in other countries, will be the imperative behavioral change toward a developmental paradigm of sustainability, resilience, inclusiveness, and equitable benefits for all."

GREENING THE GLOBAL ECONOMY

On 20–22 June 2012, world leaders, development experts, environmental advocates, and other stakeholders will gather in Rio de Janeiro for the pivotal United Nations Conference on Sustainable Development. Rio+20, as the conference has been dubbed, will mark the 20th anniversary of the historic United Nations Conference on Environment and Development in Rio, which set in motion the global drive for sustainable development. It will also coincide with the 10th anniversary of the World Summit on Sustainable Development, which reinvigorated the movement.

The conference has three stated objectives: to secure renewed political commitment to sustainable development, assess the progress and implementation gaps in previous agreements, and address new and emerging challenges. But the theme

PICTURE CREDIT: AFP (BANGKOK FLOOD), ADB PHOTO / GERHARD JOREN (SOLAR TOWER)

BRIDGE OVER TROUBLED WATER

Buddhist monks build a bridge above floodwaters in Bangkok in November 2011. A recent report by the Asian Development Bank calls climate change "the most dramatic symptom of unsustainable development."

that will dominate the Rio sessions is the urgent drive to rebalance poverty eradication and economic development efforts in an increasingly fragile global environment, experts and advocates say.

Across Asia and the Pacific, green growth and the Rio conference are topics of intense discussions these days. In early October, about 100 high-level government officials and experts from around the world convened in New Delhi, India, for a dialogue on "Green Economy and Inclusive Growth." The meeting, organized by the Government of India and the Rio+20 Secretariat, fostered a discussion on how green economy initiatives can advance poverty eradication and social development efforts by enhancing food and energy security for the poor. Later that month, the Republic of Korea hosted the Asia–Pacific Regional Preparatory Meeting for Rio+20, co-organized by the UN Economic and Social Commission for Asia and the Pacific, UNEP, and ADB. The meetings were something of a dress rehearsal for the Rio conference, as participants attempted to reach a consensus on critical components of green development.

While the nations of Asia and the Pacific are making great efforts to come together and speak as one voice at Rio, a global consensus promises to be much more difficult. The agenda for sustainable development and green growth has been fragmented by a proliferation of environmental treaties over the past 2 decades. The Rio conference offers an opportunity to bring about a more cohesive effort to help green development come to fruition.

"All of the governments participating in the Rio+20 conference will have a historic opportunity to promote a green economy as a vehicle for achieving sustainable development and poverty eradication," says the UN's Steiner. He is hopeful that the

HARNESSING SOLAR POWER **The largest solar photovoltaic power plant in Asia lies on the plains of Lopburi, Thailand.**

example of the PRC, Japan, and the Republic of Korea coming together to create a trilateral partnership to achieve low-carbon growth across the region will set the tone. "These initiatives are setting the stage for the type of cooperation we expect to see on a global scale at the Rio+20 Summit," he says. "In addition, we expect the private sector and nongovernment organizations in the region to be increasingly vocal participants in the process."

But opinions are divided as to whether the differences between developing and developed nations and other gaps can be sufficiently bridged to produce a meaningful political statement on how the global drive for green development will proceed.

"Major conferences like Rio+20 raise considerable awareness among political leaders on the issues being addressed," says Nay Htun. "This is always an important step leading to actions, including in Asia–Pacific. The Earth Summit at Rio 20 years ago raised awareness and consensus on sustainable development. I am hopeful that building upon this consensus, Rio+20 will take sustainable development to the comprehensive paradigm of greening and the linkage with poverty eradication."

But Indonesia's Salim is skeptical that the conference will produce a dramatic step forward in the struggle to achieve global green growth. He notes that the US will be facing a presidential election in November 2012, and sees little prospect that the country will risk a bold initiative that might alienate voters. Without US leadership, Europe is unlikely to support bold steps, he says.

"Expect beautiful speeches," he says, "but I don't think there will be meaningful progress."

Steiner is more hopeful.

"By all accounts, we are already moving toward a green economy," he says. "The economic imperative to achieve greater resource efficiency and develop new technologies demands that we must also consider the environmental and social aspects of this development. The Rio+20 summit will be an opportunity to guide this development and to accelerate and scale-up its implementation. If governments fail to create the enabling frameworks needed for a global transition to a green economy, they risk losing out on the many benefits that could result from mutual collaboration. Also, in the long term, countries that are already setting the pace in this area will have an advantage—from creating greater efficiencies by upgrading their buildings and industries to generating huge cost savings by leapfrogging developed countries."

"Rio+20 can be just another date in the calendar," Steiner concludes, "or an opportunity to evolve sustainable development to meet the persistent and emerging challenges of the 21st century while harvesting the opportunities for a fundamentally fresh, focused, and fair future for close to 7 billion people." ■

Atmospheric Efforts

Already among the top threats to health, outdoor air pollution is a concern in cities across developing Asia. Though the situation is improving in many areas, challenges remain as populations shift to urban centers and growing economies produce more vehicles and industry.

Air quality indicators

Selected indicators; annual ambient levels in selected Asian cities, averaged, in micrograms per cubic meter.

Particulate matter (PM_{10}[a])

Associated with lung cancer, cardiopulmonary disease; "Estimated to cause about 9% of lung cancer deaths, 5% of cardiopulmonary deaths and 1% of respiratory infection deaths," according to the World Health Organization.

Nitrogen dioxide (NO_2)

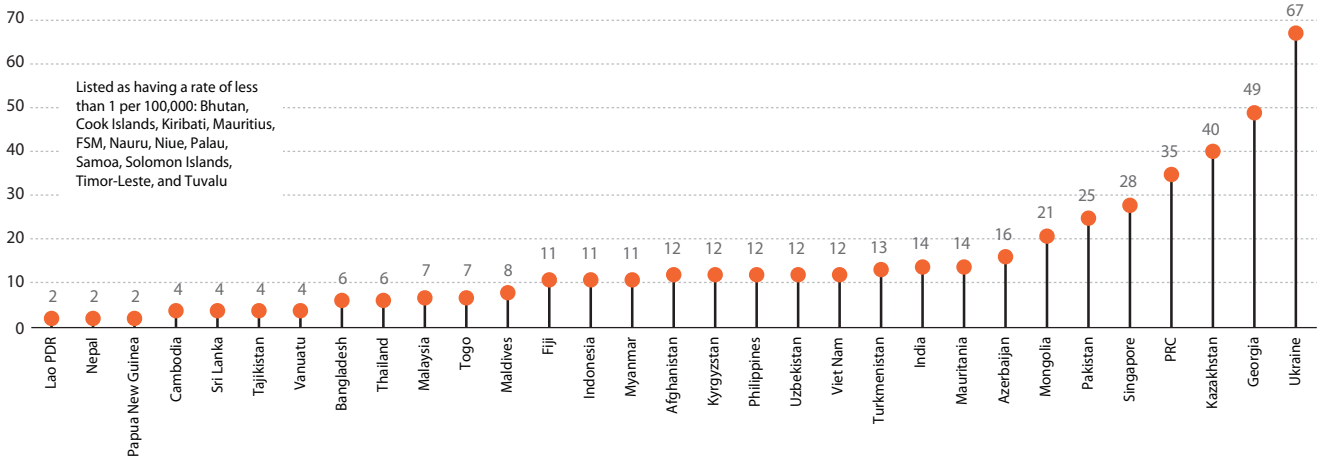
Long-term exposure may impair lung function and increase the risk of respiratory symptoms, including persistent cough in children, and exacerbate asthma.

Sulfur dioxide (SO_2)

Can affect lungs and eyes. Evidence of links to child respiratory disease and cardiac diseases, and increased mortality rate. Primary cause of acid rain.

Deaths Due to Outdoor Air Pollution

Per 100,000 population; 2008 data.



[a] PM_{10} = particulate matter of less than 10 microns in diameter

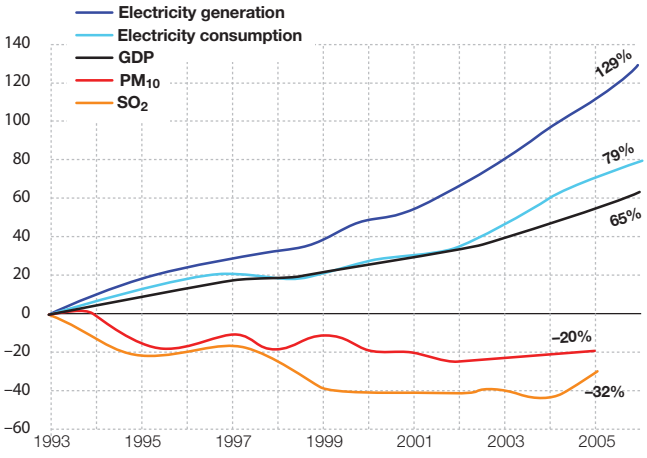
Note: FSM = Federated States of Micronesia, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

RESEARCH AND DESIGN: MARK BLACKWELL

Growing economy and air pollution

Improvements in concentration of some pollutants despite economic growth and rises in energy use have been attributed to direct efforts to manage air quality.

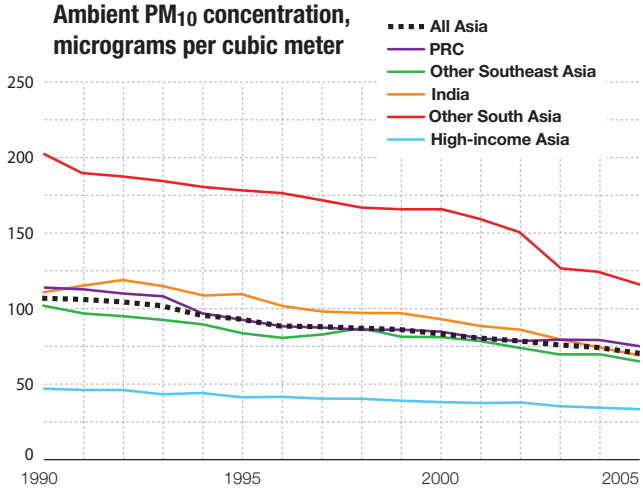
Percent Change in Concentration of pollutants and of economic indicators in Asia



Change in urban particulate matter concentration, by subregion

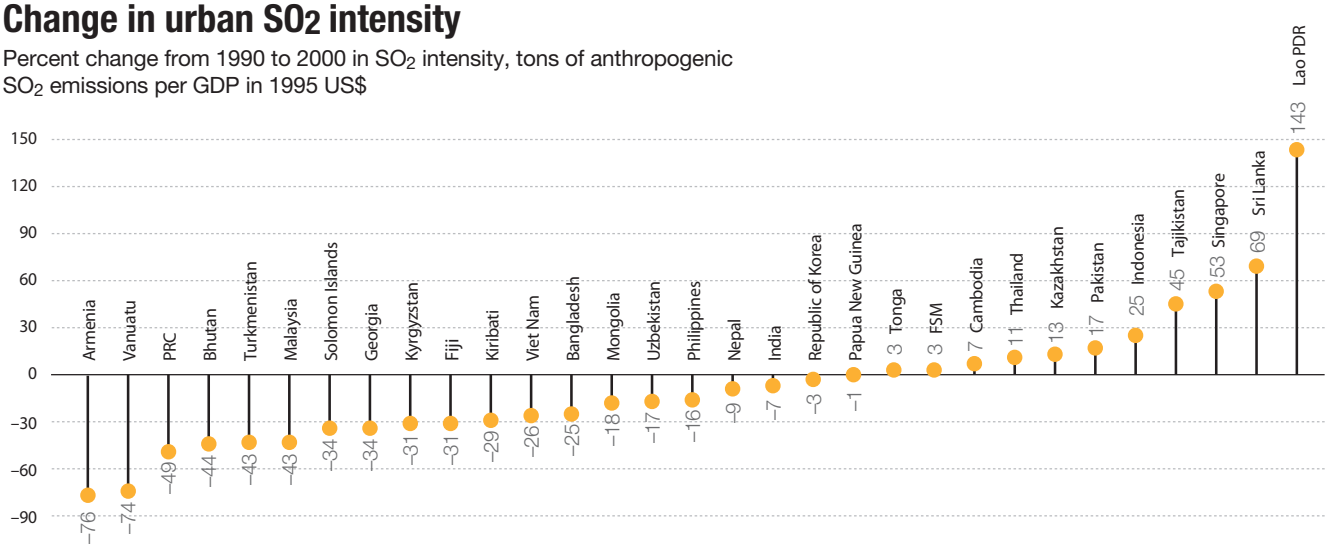
Cleaner fuels, growing energy efficiency, and falling emissions have been credited with much of the decline in urban PM_{10} concentrations.

Ambient PM_{10} concentration, micrograms per cubic meter



Change in urban SO_2 intensity

Percent change from 1990 to 2000 in SO_2 intensity, tons of anthropogenic SO_2 emissions per GDP in 1995 US$



Sources: World Health Organization (WHO).Global Health Observatory Data Repository. http://apps.who.int/ghodata (accessed 28 November 2001); Clean Air Initiative for Asian Cities (CAI-Asia) Center, 2010. *Air Quality in Asia: Status and Trends, 2010 Edition*. Pasig City, Philippines; WHO. http://www.who.int/gho/phe/outdoor_air_pollution/en/ (accessed 28 Novermber 2011); WHO. *Health Aspects of Air Pollution with Particulate Matter, Ozone and Nitrogen Dioxide*. Report on a WHO Working Group Bonn, Germany, 13–15 January 2003. www.euro.who.int/__data/assets/pdf__le/0005/112199/E79097.pdf (accessed 28 November 2011); WHO. Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide, Global Update 2005. Summary of Risk Assessment. http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf (accessed 28 November 2011); WHO. Air Quality and Health. www.who.int/mediacentre/factsheets/fs313/en/ (accessed 28 November 2011); HEI International Scientific Oversight Committee. 2010. *Outdoor Air Pollution and Health in the Developing Countries of Asia: A Comprehensive Review*. Special Report 18. Health Effects Institute, Boston, MA.

Natural Capitalist

An influential thinker on the environment explains why the planet cannot cope with infinite economic growth, and why Bhutan's gross national happiness index is no joke

BY John Otis

Ashok Khosla is one of the world's leading experts on the environment and sustainable development. He is also a pioneer. In the 1960s, Khosla was part of a team that designed and taught the first undergraduate course on the environment at Harvard University. One of his students was Al Gore.

Born in India in 1940, Khosla has jumped from academia to government to business to civil society, all the while pursuing a green agenda. After spending 22 years studying and teaching overseas, he returned to his country where he became the founding director of the Government of India's Office of Environmental Planning and Coordination, the first such agency in a developing country.

As one of the directors of the United Nations Environment Program (UNEP), Khosla designed and launched Infoterra, the global environmental information exchange. In 1982, he left the United Nations to found Development Alternatives, a Delhi-based nongovernment organization devoted to promoting commercially viable, environmentally friendly technologies. In 2002, he was awarded the prestigious UNEP Sasakawa Environment Prize. The selection committee said Khosla's work "has had a large ripple effect not only in India but around the world."

Khosla is currently president of the International Union for Conservation of Nature, an alliance of conservation agencies that focuses on finding workable solutions to the world's most pressing environmental problems. He spoke with *Development Asia* correspondent John Otis about the challenges of sustainable development, the looming possibility of a resource crisis in Asia, and the misconceptions surrounding the term green growth.

PICTURE CREDIT: AFP

DA: How did you become an environmentalist?

AK: I saw a lot of poverty and misery as a refugee and I thought that it shouldn't have to be like that. I became determined to learn everything I could that would help me contribute to a better India. While many students and professionals were emigrating out of the country, I knew I was coming back to India and I wanted to be prepared. At Harvard, I worked with Roger Revelle, a giant in the realm of science whose work led to the discovery of climate change. This was way back in the 1960s when the environment movement was focused on chemical pollution, famine, and population growth and that was about it. In the mid 1960s, because of the work of Rachel Carson and others, concerns also began to grow about contamination of our food chain, or acid rain. We became inspired by having to react to this one-sided view. We came to the conclusion very early in the game that environmentalism was meaningless unless it was combined with the issues of society and human development.

DA: What's your view of Asia's unprecedented economic growth?

AK: One problem is that gross domestic product (GDP) growth has become a sacrosanct goal in its own right. The Indian government talks about GDP growth as if it's the only thing that counts. So does the People's Republic of China (PRC). So does the

United States. So does everybody. But continued exponential growth that depends on the use of more and more materials from a finite resource base will hit a dead end sooner or later. Asia started out as a kind of workshop for industrialized countries. Now Asia is becoming industrialized in its own right. But it's happening mainly by copycatting Western and Northern models that haven't worked and from which people are now trying to save themselves. These models are totally inappropriate in terms of resource management, energy, and water use, and the treatment of human beings and nature. So the word "growth" carries a connotation which I think is very unhealthy: that it's a desirable aim to keep on growing. It is not, unless one wishes to be like a cancer.

DA: But economic growth has also helped legions of Asians move up in the world.

AK: Yes, half a billion people have been pulled out of poverty. But tell me how many people have been left behind in poverty. And that's a larger number. We have actually destroyed far more [natural capital] than we have created. This is true in the PRC and India and it is now beginning to happen all over Southeast Asia too. India has lost large tracts of its forests and wetlands. The PRC has neglected its resource base to the extent that its rivers are drying up, its soils are degrading, and vast areas must, for example, deal with dust storms.

DA: Are Asian nations discussing the limitations of growth?

AK: Mahatma Gandhi raised many of these same questions 100 years ago and they are all coming back into the mainstream discussion today. Many civil society organizations and some academics question the way things are going. There is a growing body of forward-thinking political leadership. I see that in the Republic of Korea, in Bhutan, and even in India where we've had some highly dedicated government ministers. But they have gained very little sustained traction. Most political leaders and captains of industry don't have any questions regarding the negative aspects of growth at all. Zero. Nada. Zip. It's not just the Asian governments. Most if not all governments are like this. They represent the interests of the people who get them elected. And those people are the rich, the industrialists, and the business people. These are vested interests; people with their snouts in the trough who are getting a great deal out of the present system. They have the power, money, connections, and ability to stop anything from changing.

"The word 'growth' carries a connotation which I think is very unhealthy: that it's a desirable aim to keep on growing. It is not, unless one wishes to be like a cancer"

—Ashok Khosla

DA: Do you see any major businesses moving toward greener practices?

AK: You tell me. Who are you talking about? Tell me which mining company has improved its performance vis-à-vis people or nature? There must surely be some companies. But I'd rather you tell me who they are because none comes to the top of my mind very easily.

DA: Yet there is a strong economic argument in favor of a more sustainable model.

AK: Literally, trillions of dollars in natural capital such as forests, soil, water sources in the form of glaciers, rivers, and groundwater are being "mined" without replacement and therefore lost every year. This is so obvious that no one can deny it. But the people who really understand this are not in mainstream economics, and there are not enough of them to make a difference. As for the costs of reform, if you change the patterns of production and consumption right now, it will cost much less. If action is delayed and is forced upon us, it will come at a much higher cost.

DA: Could Asia change its tax policies to foment a green agenda?

AK: If you want to discourage bad things—like resource consumption, waste creation, and inefficiency—you should be taxing those things. And you should subsidize the good things, like employment and the creation of jobs. But over the last 70 or 80 years, systems have been designed to tax the good things, such as income, and encourage the bad things, such as resource extraction and wasteful use of energy. That makes no sense whatsoever. We have got to have a fundamental rethinking of our tax structure. But I don't see many governments or even economists proposing changes. And once you get locked into these tax systems, you can't get out of them because large bureaucracies and government agencies acquire a permanent life of their own.

DA: Do you see Asia heading toward an environmental catastrophe?

AK: The short answer is "yes." Simple computer models have already shown this. So did the 1972 book *The Limits to Growth.* Things are unfolding even faster than the book predicted—that within 100 years from its publication in 1972, we are running into a situation of overshoot and collapse. The world's population and economy increase; food demand continues to grow; and agricultural and industrial production keep on going. But the resource base

HAPPY PEOPLE Bhutanese students cross a long bridge on their way to school. The King of Bhutan has made it a national priority to raise gross national happiness, which he considers a better measure of prosperity than gross domestic product (GDP).

and the systems that absorb our wastes are breaking down. Today, the Arctic ice is melting at a rapid rate and could be gone in 30 years, something that hasn't happened in tens of thousands of years. It's dramatic. We are way ahead of schedule. *The Limits to Growth* was talking only about 100 years. Already, within 40 years, we see all the signs of overshoot and collapse.

DA: Will it be overshoot and collapse that finally bring about deep-seated changes in the region?

AK: Our governments may gradually start to react a little but reform is not likely to come from within; it is likely to be a waiting game for a while until the sea levels rise significantly, the fish are gone, there is no water to drink, and hungry people are rioting in the streets for reasonably priced food. This could be in another 10 years, maybe 20, which is not long—during our lifetimes. The fundamental premise of modern development is that the living standards of every generation should be better than those of earlier ones. How are the governments, companies, international development agencies going to explain the circumstances that lead to a rapid, though avoidable, deterioration in the lives of our children? Very soon change will be forced upon governments, businesses, and agencies by public opinion or international treaties—or major events such as Hurricane Katrina or the Fukushima Tsunami.

DA: What's been the impact of international climate treaties?

AK: They force government officials to recognize environmental issues. But governments can repackage them in different ways and continue to do what they are doing. So the treaties are not always lending to correct outcomes. Industrialized countries are playing a very negative role because they want to palm off the costs of things they've been doing for the past 200 years onto poor countries. Climate change, the loss of species, and the destruction of habitats have not been caused by poor countries. And yet in international negotiations, the rich countries cynically want the poor countries to take responsibility for doing something about it without themselves making any commitment at all.

DA: What about the concept of green growth as an alternative path forward?

AK: Green growth does not simply mean making power plants more efficient or planting more trees. It is about making fundamental changes in our consumption patterns and our production systems. Those who are currently in positions of privilege unfortunately see green growth as a means to continue their predatory patterns of exploiting the earth's resources and wasting large amounts of these while proselytizing to others that they must behave more responsibly vis-à-vis the environment. Perpetual, lopsided, resource-guzzling growth cannot be sustained on a finite planet or in a fair and just world. Green growth is about an equitable bootstrapping of the economy so that everyone benefits from it. It means an environmentally and economically sound way of creating economic opportunities where everyone can have a job, and a decent life, and can send their kids to school. But that's not what's happening in any of these places.

DA: Why not?

AK: There's this idea that green growth is a hard thing to do. Most people perceive it as sacrificing things we are supposed to value for the good of the planet, like switching from comfortable fossil fuels to less familiar and renewable energies like wind and solar. But I don't think that's a good way to pursue green growth. Green growth should be something that's a great privilege to have. We have to transform the thinking of people and institutions so that they value things that are good for them in their own right. If you could redefine the term to be something positive, that involves changes in consumption patterns and production systems to make human life more interesting, more fulfilling, and happier, then the term green growth would be okay. But the concept of green growth also has to be tempered with the understanding that you can't keep growing forever on a finite resource base. Sooner or later, the word "growth" will trip over itself.

DA: Aren't there some spots on the map where green growth is catching on?

AK: In Bhutan they are pursuing sustainable development with great dedication and the people have wholeheartedly adopted the idea of gross national happiness as a societal goal far superior to GDP. They don't see it as a sacrifice. They see it as a great privilege and the best way to live. From the King and the Prime Minister on down to the little schoolchildren, they are basically willing to say: "No,

PICTURE CREDIT: ADB PHOTO/JAMES HUTCHISON, AFP (INDONESIA)

thank you; we don't want the kind of life 'modern' societies have become addicted to. We are interested in having a full life with clean, healthy food and good education." And they made their commitments. That doesn't mean every Bhutanese has made that commitment, but a very large majority has.

DA: Is Bhutan's experiment with gross national happiness having much impact elsewhere in Asia?

AK: What is the purpose of life? The United States Constitution begins with: "The pursuit of happiness" as being next to only life and liberty. So even 250 years ago, people were talking about it. What's more, the shortcomings of measuring progress through GDP are horrendous. It does not include the work of nearly half the population—housewives—or the loss of environmental assets such as forests or soils, or the breakdown of social capital such as family and community. And that is only the beginning of a whole litany of shortcomings of this so-called "measure" of societal progress. Who, other than an economist, would consider this a meaningful way to gauge the health of a society? GDP is such a flawed instrument that it actually includes the cutting down of trees—which is the destruction of natural capital—as positive income. It's such a ridiculously bad measurement, yet GDP is accepted by the experts who run our world as being the only way to describe progress. On the other hand, if you tell them about gross national happiness, they will laugh. Still, these are concepts which, like others, have their tipping points. Once GDP becomes dysfunctional and disreputable, people will start looking for something else to describe progress. Some work on this has already started, such as the [United Nations Development Programme's] Human Development Index.

GLOBAL WARNING **An activist dresses as a penguin at a demonstration held during an international climate change conference in Indonesia. Khosla sees civil society playing a major role in convincing governments to address climate change issues.**

DA: Do you expect any concrete progress to come out of the 2012 Rio Summit?

AK: The first global environmental conference was in 1972 in Stockholm. Twenty years later we had the Rio Earth Summit, then came Johannesburg, and now another one in Rio. In between we've had the Millennium Development Goals. Yet the world isn't better off. I don't want to sound like a one-string guitar, but the vested interests are the root of the problem. The people who call the shots are not really very worried about what happens to the rest of us—now or in the future. But though nothing much has happened, each one of us keeps saying: "If we don't try now then it will get even worse." So we all go to these summits and we all try to do something. And most of us keep hoping that maybe something will come out of it.

DA: What other developments give you optimism?

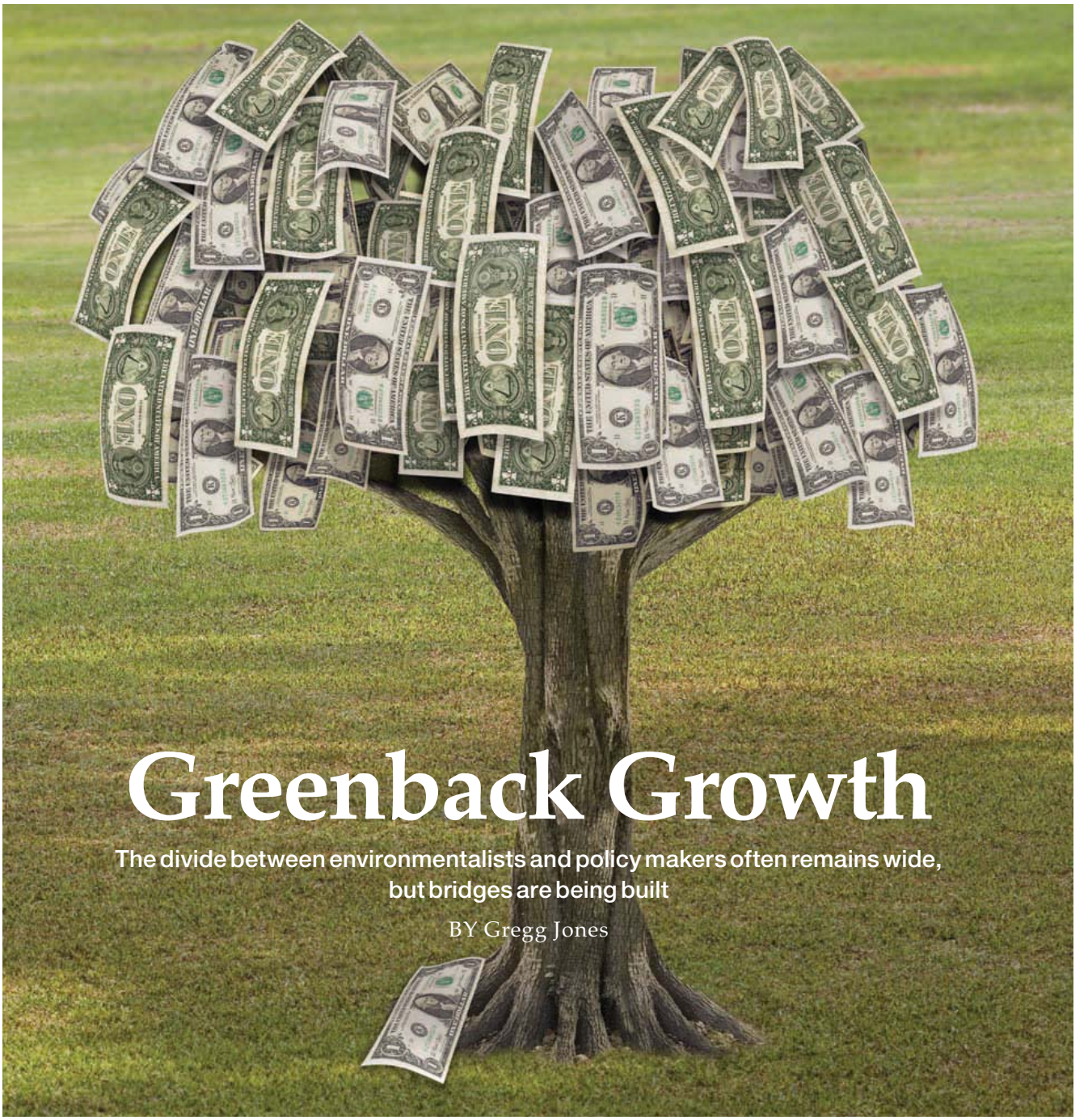
AK: One can be optimistic that after a few encounters with catastrophe people will realize that things have to change. I also think that if there is hope for the future it is because of civil society, which has the diversity and the anger and the willpower to try to stop the inexorable drive with a foot pressing the accelerator pedal toward the cliff.

DA: What role can new technology play?

AK: Nature-based technological innovations can help save humanity. There's a white beetle from Indonesia from which we can learn about how to make a cement substitute without having to use any energy or high temperatures. Spider silk is stronger than titanium per unit of weight and could be used on things normally made with aluminum, titanium, or steel. These technologies could have their renaissance in Asia because they fit some of the philosophies of this region. They also provide Asia with an opportunity because we haven't yet made all those investments in traditional infrastructure. For example, we don't have all the roads that preordain the car as a main mode of transport. Why not try other ways, like airships?

DA: What is Asia's potential role in setting a greener agenda?

AK: Asia is in a position to play a major leadership role in the new thinking that is required to make the world a better place. It can set a real example by setting new kinds of social, economic, and political goals that are not simply copycat goals from the West or the North, but ones that make sense to our traditions and cultures. The civilizations of Asia are quite ancient and have centuries, if not millennia, of thinking about how to live peacefully and in harmony with nature. But it seems to me they have temporarily forgotten many of these lessons. Deep down these lessons should still be available to them. And if they access them soon, they could bring about significant changes that would be a model for the rest of the world. If not, we are in real trouble. ■



Greenback Growth

The divide between environmentalists and policy makers often remains wide, but bridges are being built

BY Gregg Jones

Environmental activists for years have stressed the importance of preserving the planet's biological diversity. But in a region that is home to two-thirds of the world's poor, it has proven politically difficult for Asian governments to turn away corporations and their cash-generating proposals for exploiting scarce natural resources.

The debate has been largely one-sided. Corporations could lay out spreadsheets with revenue projections for a proposed project, while conservationists struggled to quantify the financial benefits of resource protection. In the meantime, in Asia and around the globe, legal and illegal commercial interests cut forests and mangroves, mined the landscape, and harvested rare plants and animals—setting in motion a precipitous decline in the region's natural capital.

Lately, however, conservation-minded policy makers and environmental activists are finding a more level playing field.

Changes underway in Viet Nam illustrate the new dynamics. After years of mangrove destruction to make way for shrimp farms and fish ponds, the government invested more than $1 million in planting and

protecting nearly 12,000 hectares of the vital coastal trees. The return on its investment has been impressive: The Southeast Asian nation is now seeing annual savings of more than $7 million in dike maintenance, a return that corporations around the world might envy.

The loss of biodiversity—the totality of the planet's living organisms and the ecological complexes they inhabit—is now recognized as perhaps the planet's preeminent threat.

Asia and the Pacific is home to many of the earth's richest ecosystems, says Nessim Ahmad, director of Asian Development Bank's Environment and Safeguards Division. Around 60% of the world's plants and animals are found here, along with about 50% of the planet's remaining coral reefs and 17% of its wetlands. Protecting these resources is not just a matter of environmental stewardship; it is also about economic growth. Ecosystem services are worth 10–100 times the cost of protecting them.

Achim Steiner, a United Nations under-secretary-general and executive director of the United Nations Environment Programme (UNEP), cites an example that is critical to the survival of millions of Asians: coral reefs. Even as these vital tropical ecosystems are degraded and destroyed at a soaring rate, their value has been overlooked by national policy makers and international development institutions, he says.

"If you factor the true value of coral reefs into economic planning, it is likely that far more rational and sustainable choices would be made in terms of development, emissions and pollution control, and resource management," Steiner says at the launch of a year-long celebration of biodiversity in 2010. "It is a similar story in respect to all of the planet's nature-based assets, from forests and freshwaters to mountains and soils."

Time is running short, he warns.

"The urgency of the situation demands that as a global community we not only reverse the rate of loss, but that we stop the loss altogether and begin restoring the ecological infrastructure that has been damaged and degraded over the previous century or so."

A critical first step in that direction has been a UN-guided initiative designed to calculate the value of nature and the cost of lost natural capital. As a result, in ministerial buildings and conference centers around Asia, the economics of biodiversity is the focal point of attention.

ECONOMIC VALUE OF BIODIVERSITY

The efforts to quantify and save global biodiversity are being driven by the precarious state of the world's declining ecosystems. Annual biodiversity losses range between $2.0 trillion and $4.5 trillion, according to the key findings of an international initiative, The Economics of Ecosystems and Biodiversity (TEEB). On the flip side of the equation, an annual investment of $45.0 billion in global conservation efforts would yield $5.0 trillion in ecosystem savings, the study found.

The TEEB initiative grew out of a 2007 proposal by the environment ministers of the Group of Eight leading industrialized countries and five major developing countries (Brazil, the People's Republic of China, India, Mexico, and South Africa) to

"If you factor the true value of coral reefs into economic planning, it is likely that far more rational and sustainable choices would be made in terms of development, emissions and pollution control, and resource management"

—Achim Steiner, United Nations under-secretary-general and executive director of the United Nations Environment Programme

CONVERSION COST India has created a system of compensatory payments for converting forest land to other use. Payments go to improving the country's forest cover, conserving wildlife such as the Royal Bengal tiger, and creating rural jobs.

PICTURE CREDIT: JUPITER IMAGES (MONEY TREE), AFP

AMAZON OF THE SEAS **A local diver watches different varieties of fish weave through a maze of corals in Puerto Galera, Philippines. The country is part of the Coral Triangle Initiative, which was formed to save one of the world's most diverse and threatened marine ecosystems.**

value the economics of biodiversity loss. Germany and the European Commission launched the study, with subsequent financial support by the UNEP and several other European countries. The objectives included drawing attention to the global economic benefits of biodiversity, highlighting the growing cost of biodiversity loss and ecosystem degradation, and providing practical solutions, such as establishing an objective global standard for natural capital accounting.

Led by Pavan Sukhdev, a senior banker at Deutsche Bank, TEEB released the first of five reports in 2008. Its studies have highlighted the economic losses and human costs caused by vanishing biodiversity.

"Nature is the source of much value to us every day, and yet it mostly bypasses markets, escapes pricing, and defies valuation," Sukhdev writes in the initial report. "This lack of valuation is, we are discovering, an underlying cause for the observed degradation of ecosystems and the loss of biodiversity."

Biodiversity loss is critical to global development efforts because poverty, climate change, biodiversity, and the loss of ecosystems like tropical reefs or forests are "inextricably intertwined," the TEEB report notes. Indeed, the study finds that the poor were typically the immediate beneficiaries of ecosystem services and biodiversity. "The livelihoods most affected are subsistence farming, animal husbandry, fishing, and informal forestry—most of the world's poor are dependent on them."

"Nature is the source of much value to us every day, and yet it mostly bypasses markets, escapes pricing, and defies valuation"

—Pavan Sukhdev, a senior banker at Deutsche Bank

For decades, environmental activists have struggled to convince policy makers of the hidden costs of lost biodiversity and natural resources. From a policy maker's perspective, the value of exploiting resources was far easier to measure: The government sells permits to allow a company to mine copper or gold, cut timber, or catch fish, and the company, in turn, pays taxes and profits from its activities.

But what went unrecognized—or at least unacknowledged in policy circles—for decades was the cost of depleting those resources, and the resulting loss of ecosystem biodiversity.

Now, the use of recently developed accounting tools and techniques is allowing policy makers to weigh the negative impact of certain activities against the value of ecosystem services, such as the carbon sequestration and water cycle regulation of a tropical forest, or the storm protection provided by a mangrove forest.

One example that TEEB cites is a cost–benefit analysis of converting mangroves into shrimp farms in southern Thailand. With government subsidies, commercial shrimp farms generate returns of about $1,220 per hectare. But local communities lose about $12,000 per hectare in ecosystem services, stemming from the loss of wood and non-wood forest products, fisheries, and coastal protection, the study notes.

Around Asia, freshwater and coastal wetlands are now seen as providers of economically valuable ecosystem services. Using new accounting tools, wetlands around the city of Vientiane, the Lao People's Democratic Republic, for example, have been estimated to provide $5 million in flood prevention services.

The hidden costs of forest loss, a major problem across much of Asia, have also been revealed by the new efforts. One study has valued pollination services provided by forests in Sulawesi, Indonesia, at about $60 per hectare. The conversion of forested areas to farmland and other uses is expected to reduce those pollination services, with significant economic consequences for coffee growers: yields reduced by up to 18%, and net revenues per hectare will decline by as much as 14% over the next 2 decades.

At the Conference of the Parties to the United Nations Convention on Biological Diversity in Nagoya, Japan, in 2010, World Bank President Robert

HEART OF BORNEO **Clouds cover a forested mountain in West Kalimantan province on Borneo island. In 2007, Brunei Darussalam, Indonesia, and Malaysia signed a declaration to protect the Heart of Borneo, where only about half of the original forests remain.**

Zoellick announced a 5-year pilot program to expand the efforts to use innovative accounting tools to measure the value of ecosystems. "It's a way of trying to help people understand better in economic terms the value of natural wealth," says Zoellick.

COMPENSATING NATURE

Asia is also at the forefront of other new methods designed to address the loss of biodiversity and ecosystem degradation, including payments for ecosystem services (PES) programs.

A 2006 Supreme Court ruling in India resulted in the creation of a system of compensatory payments for converting various types of forest land to other use. Values were assigned according to the use of the land, ranging from timber and ecotourism to such non-use values as conserving the Royal Bengal tiger and Asiatic lion. Under the system, a permit must be obtained to convert a forest to other uses and payments made into a publicly managed fund devoted to improving India's forest cover, conserving wildlife, and creating rural jobs.

In Viet Nam, under a pilot PES policy created with assistance from the Asia Regional Biodiversity Conservation Program, two hydropower facilities have agreed to pay $2.8 million to more than 2,000 forest-dwelling households to help protect watersheds that supply the hydropower plants. This will increase incomes for subsistence households while reducing operating costs and improving the long-term sustainability of the plants.

On a global scale, efforts are underway to reduce greenhouse gas emissions through a program known as Reducing Emissions from Deforestation and Forest Degradation or REDD+.

With Asia's population rapidly shifting from rural areas to urban centers, a major challenge for the region is addressing the ecosystem impact of overpopulated cities. Urban activities already account for about 67% of the world's energy consumption and 70% of greenhouse gas emissions. Urban dwellers also account for most of the global demand for fresh water, wood, and other raw materials.

Singapore, which has devised a city biodiversity index to help guide its development plans, has been a leader in protecting biodiversity in an urban setting. Among its wilderness areas open to the public are Sungei Buloh, a mangrove park restored from shrimp farms, and Bukit Timah Nature Reserve, which encompasses primary and secondary tropical rainforest.

The city of Nagoya, Japan, has also distinguished itself by introducing a system of tradable development rights to help preserve its vanishing green space. Developers who wish to exceed limits on high-rise buildings must buy and conserve green areas at risk of development. Other incentives include discounted bank loans for developers that incorporate more green space with their projects.

City dwellers, along with rural communities and businesses, can expect to receive benefits from such efforts. At the national and international levels, the TEEB researchers note, there is an added payoff for policy makers who place a premium on biodiversity and ecosystem services: They are likely to enjoy stronger economic growth in the decades ahead. ■

GARDEN CITY **A couple looks down from a walkway on a canopy of trees in Singapore, dubbed the "Garden City of Asia." The city-state follows a biodiversity index in its development plans.**

PICTURE CREDIT: AFP; ADB PHOTO/LESTER LEDESMA (SINGAPORE)

Dirty Business

Asia is on the receiving end of some of the world's most toxic waste

BY William Branigin

E-WASTE EXPOSÉ **Activitists mount an installation made from computer monitors on a truck during a protest in New Delhi in 2007. Watchdog groups have exposed the threat posed by the improper processing of these toxic materials to health and the environment.**

PICTURE CREDIT: AFP

By the dozens each day, cargo ships pull into port in Hong Kong, China, and offload 40-foot containers filled with discarded electronic goods from elsewhere in the world, mostly from North America. The refuse is typically taken to fenced scrapyards or warehouses for initial sorting north of Kowloon, then moved into the People's Republic of China (PRC) by truck or boat.

The electronic waste, known as e-waste or e-scrap, often ends up in Guiyu, a town about 22 miles west of Shantou in rural Guangdong Province. There, thousands of workers, many of them women and children, use basic tools, open burning, and acid baths to recover copper, steel, plastic, aluminum, computer chips, lead-tin solder, and small amounts of precious metals such as gold. But in the process, they expose themselves and the environment to a host of toxins including lead, mercury, cadmium, beryllium, and brominated flame retardants.

The situation in Guiyu, documented by watchdog groups, such as the Basel Action Network and Greenpeace, represents one aspect of the growing problem of hazardous waste in Asia. It also exposes what the groups have called the dirty little secret of the electronics recycling industry: the common cost-cutting practice of simply exporting e-waste from countries, such as the United States, instead of processing it safely at home.

A FAST-GROWING PROBLEM

For several years now, e-waste has been the fastest-growing waste problem in the world, according to the United Nations Environment Programme (UNEP) and its affiliated Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. E-waste accounts for about 8% of

municipal waste and is estimated to be piling up at 3 times the rate of municipal waste worldwide.

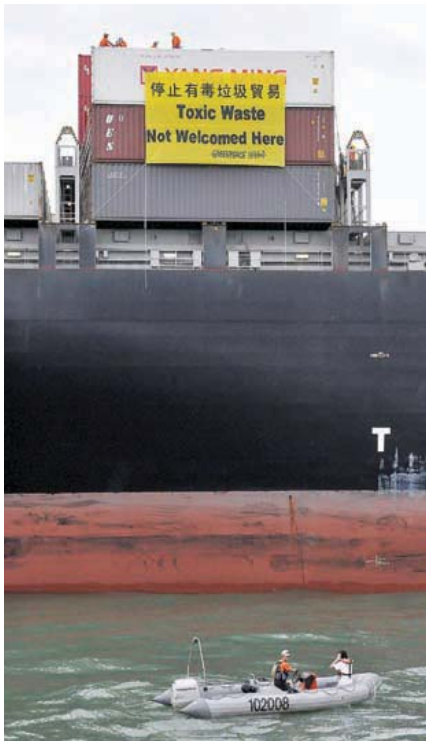
"It is exponentially growing," says Katharina Kummer Peiry, head of the Swiss-based Basel Convention secretariat. "At the time the Basel Convention was adopted in 1989, this did not even exist as a waste stream. Now e-waste is the key waste stream that the Basel Convention is looking at."

According to Jim Puckett, executive director of the Seattle-based Basel Action Network, a group working to address toxic waste issues, up to 80% of the e-waste collected in the US for recycling actually ends up being exported. Much of it comes from entities such as government agencies and schools that sign recycling contracts with the lowest bidder, he says. Shipping containers tracked by his group have made their way to India, Indonesia, Malaysia, Pakistan, and Viet Nam, Puckett says, but most are still going to Hong Kong, China, en route to the PRC.

Like hazardous waste generally, the explosion of e-waste has been driven in part by population growth and rising consumption. But it also owes much to the astonishing proliferation of high-tech devices worldwide, rapid obsolescence, manufacturing techniques that make disassembly difficult, and widespread unawareness—even in developed countries—of the toxic nature of materials hidden in personal computers, cell phones, monitors, and many other electronic products.

> **"The world population is steadily increasing, consumption levels are growing, and as a result the global waste heap is getting bigger and bigger"**
>
> **—*Vital Waste Graphics 3*, produced for the Basel Convention and the United Nations Environment Programme**

"The world population is steadily increasing, consumption levels are growing, and as a result the global waste heap is getting bigger and bigger," says a draft report, *Vital Waste Graphics 3*, produced for the Basel Convention and UNEP. By mid-century, it says, a projected world population of 9 billion is expected to generate more than 13.1 billion tons of waste a year, about 20% more than in 2009.



TOXIC EXPORT Greenpeace activists in Hong Kong, China lower a banner on a cargo ship allegedly carrying an illegal shipment of electronic waste from the United States in 2008.

A PROLIFERATION OF PLASTICS AND TECHNOLOGY

Because of varying definitions and reporting mechanisms, it is difficult to estimate how much of global or regional waste is hazardous. But a major concern is the soaring share of municipal wastes represented by plastics. Now massively manufactured all over the world, plastics are used in more and more products, including electronics, and can absorb and transfer persistent organic pollutants, known as POPs—chemicals, often used in pesticides, that endure in the environment and accumulate in the food chain.

Although plastic waste often ends up in landfills, it also now abounds in the world's oceans, where large rotating surface currents called gyres have formed "entire floating islands of marine debris," according to *Vital Waste Graphics 3*. Large high-density concentrations of more than 50,000 plastic particles per square kilometer are found in the North and South Pacific (as well as the North and South Atlantic), while a vast medium-density swath of 20,000-plus pieces per square kilometer floats in the Indian Ocean, the report says. Within those gyres, it says, "marine fauna ingest plastic or become entangled in it," while most humans remain oblivious.

In Asia as in other regions, mounting concerns about hazardous waste have been accompanied by a dramatic shift in the production and usage of information and communication technology (ICT). Since 2003, mobile phone subscribers in the developing world have outnumbered those in developed countries and now account for nearly 70% of the world total. The volume of obsolete personal computers in developing countries is projected to exceed the number in developed nations by about 2016.

The International Telecommunication Union has estimated that the number of mobile phones in use worldwide

MONEY FROM TRASH **A boy collects usable materials among the garbage washed up at Manila Bay. More than 15 million people, almost all of them in developing countries, make a living by scavenging for recyclables.**

increased from 145 million in 1996 to more than 4 billion in 2008, a year when sales of mobile handsets reportedly reached 1 billion. With most mobile phones destined to be discarded within 1–3 years of purchase, it is no wonder that the ICT industry is projected to generate 53 million tons of e-waste by 2012.

A GLOBAL WASTE MARKET

Of the e-waste, only about 13% is reported to be recycled, with or without adequate safety procedures, according to the 2010 annual report of Global Information Society Watch (GISWatch), a network that promotes sustainable ICT. Yet, that is enough to fuel a global waste market worth roughly $300 billion a year. Worldwide, waste picking or scavenging in an informal recycling industry provides income to more than 15 million people, almost all of them in developing countries.

In the PRC, at least 10 million people work in recycling, roughly 700,000 of them in the e-waste sector, according to UNEP. There, Guiyu has emerged as the "ground zero for the electronic waste trade," says Puckett, who has personally investigated conditions in the town for the Basel Action Network.

Although it is illegal to import hazardous waste into the PRC, he says, roughly 50–100 shipping containers filled with e-waste arrive in Hong Kong, China, each day, destined for a recycling industry that since the mid-1990s has transformed Guiyu from a poor, rural, rice-growing community into a booming—but heavily polluted—processing center for discarded electronics. As a result, the area's groundwater has been contaminated, forcing authorities to build a pipeline to bring in fresh water from 30 kilometers away, Puckett says. Levels of dioxins and heavy metals are some of the highest in the world, and tests have shown elevated lead levels in children's blood, he says.

Conditions in India and Pakistan, where e-waste processing has mushroomed, may be even worse than those in the PRC, the Basel Action Network reports. It cites the open burning of circuit boards by child laborers in New Delhi neighborhoods and unventilated operations in Karachi using blowtorches and acid—all to recover chips and precious metals.

"Increasingly, India is becoming a dumping ground for e-waste," according to a country report published by GISWatch. India generated about 300,000 tons of e-waste in 2007, an amount projected to grow to 1.6 million tons by 2012. In addition, about 500,000 tons a year of e-waste are imported illegally, the report says.

The Government of India has drafted rules to manage e-waste, but they do not cover the informal sector, where 90% of the country's e-waste recycling is carried out, according to the 2010 report.

In the Philippines, where mobile phone subscriptions have skyrocketed and electronics make up more than 40% of imports, dumpsite scavengers commonly swarm over landfills that contain e-waste mixed with other solid waste. But under a recycling loophole in the Basel Convention, a trade in secondhand electronics has developed, contributing to the growing heaps of e-waste, GISWatch reports. In 2007 alone, 98,823 tons of second-hand electrical and electronic equipment were imported, mostly from Japan and the Republic of Korea.

Moreover, a 2008 agreement with Japan allowed the importation of Japanese chemical, hospital, and municipal wastes into the Philippines, angering environmentalists and prompting one Philippine newspaper to complain that the country was "positioning itself as a global waste dump."

BASEL CONVENTION SEEKS SOLUTIONS

Like the PRC, India, Japan, the Republic of Korea, and most Southeast Asian nations, the Philippines has ratified the 1989 Basel Convention, which was designed to reduce the movements of hazardous waste among nations. It took effect in 1992 and now has 178 parties. The US has signed but not ratified it.

A more ambitious measure, known as the Ban Amendment, was adopted by the convention's parties in 1995

PICTURE CREDIT: AFP

with the aim of prohibiting all exports of hazardous wastes from developed countries to developing nations for any reason. It has been ratified by 71 countries, but it has not yet entered into force, and key countries such as Japan, the Republic of Korea, and the US have refused to sign it or honor its provisions. In the US, the world's biggest e-waste exporter, the scrap industry has vigorously opposed such provisions on grounds they restrict free trade.

But advocates of the amendment see some hopeful signs. A conference of the Basel Convention parties in Colombia in October last year resolved a longstanding deadlock by agreeing that 17 more ratifications are needed for the Ban Amendment to take effect.

Perhaps more importantly, according to Kummer Peiry, the Basel Convention executive secretary, the parties adopted a "paradigm shift in the way that wastes are looked at." Instead of focusing mainly on controlling "waste disposal and transboundary movements," she says, the conference agreed to embrace more of a "life-cycle approach, so that prevention and minimization of waste should be promoted by the parties and all stakeholders."

> **"We could really have toxic-free equipment now, and certainly in 5 years, if the will was there"**
>
> **—Jim Puckett, executive director of the Seattle-based Basel Action Network**

This means more emphasis on "green production," aimed at minimizing toxic materials in the manufacture of electronics, for example, and at "using recycling as an acceptable way to generate green jobs and opportunities."

At the Basel Action Network and other advocacy groups, innovative solutions are in the works, Puckett says. One example is the development of a "benign chemical method" for stripping circuit boards using "nonaggressive chemicals," which would at least mitigate some of the harmful health and environmental impacts of e-waste processing in the informal sector.

The Basel Action Network and other groups also promote "take-back" programs in which manufacturers are required to accept their old products from consumers for proper recycling. Such programs have gained traction in many countries, including the PRC, where consumers are paid to turn in equipment they no longer want, Puckett says. But the program applies only to products sold in the PRC. Domestic e-waste "is a problem, and [the People's Republic of] China is working on it," Puckett says. "But they're turning a blind eye to the smuggling in Hong Kong, China and the imports into Guiyu, unfortunately."

Environmentalists are also pushing cleaner production as a way to limit hazardous waste at the source and curtail the techno-trashing of the planet. Manufacturers "are doing much more work on that now," although they are "not aggressive enough," Puckett says. "They're really timid to market green products."

He cites the example of a major mobile phone maker that has produced a "toxic-free phone" but has resisted publicizing it. The company does not want to highlight the fact that the rest of its products contain toxic materials, of which the public is largely unaware, Puckett says. He adds that consultants of manufacturers have admitted to him that they have the ability to eliminate hazardous materials from computers and other high-tech products by 2015, if not before.

"That's the frustrating thing. We could really have toxic-free equipment now, and certainly in 5 years, if the will was there," Puckett says. "So much of this stuff is avoidable." ■

FASTER THAN TWEETING **A gambler in Phnom Penh talks on 18 mobile phones at the same time as he comments on a boxing match. Environmentalists fear that the proliferation of mobile phones in Asia will compound the problem of e-waste in the region.**

Dry Cough

Booming economies and an expanding car-loving middle class are fouling Asia's skies… and they might be the best way to clear them

BY Floyd Whaley

PIERCING THE HAZE **A policeman directs traffic on a foggy morning in New Delhi. Below, an auto-rickshaw refuels at a compressed natural gas (CNG) station in the Indian capital.**

In the late 1990s, the Indian city of Delhi was nearly intolerable. A thick haze blanketed the metropolis on most days, and residents routinely had to breathe one of the deadliest types of air pollution, the toxic particles blasted from the back of vehicles called particulate matter.

Driven by public outrage, and activist lawsuits, the country's court system compelled the city and national governments to act. Thousands of polluting textile and chemical plants were ordered to clean up or close, and most significantly, all public transport—including buses, taxis, and motorized tricycles—were required to convert to cleaner-running compressed natural gas (CNG).

The results were impressive. The country's Central Pollution Control Board reported a 24% decrease in deadly particulate matter in Delhi's air from 1996 to 2002. This saved an estimated 3,629 lives per year, according to a 2005 World Bank report.

Though Delhi's booming population and explosion of vehicle ownership has reversed many of the gains made by the CNG conversion of the late 1990s, the experience of the city remains an example often cited by

PICTURE CREDIT: AFP

environmentalists and government officials alike of how big cities' skies can be cleaned up.

Throughout Asia, major cities are facing a similar situation. Thriving urban centers in some of the fastest growing economies in the world are producing more exhaust-belching vehicles, more private air conditioners, more factory smokestacks, and levels of urban pollution unseen since the first decades of the 1900s in Europe and North America.

"In Asia, the high rate of urbanization and economic growth has led to a rapid increase in vehicles and energy consumption," says Sophie Punte, executive director of the Clean Air Initiative for Asian Cities, established by the Asian Development Bank and other partners. "This has happened quickly. The economic development in Asia that has taken place in the last 2 decades took hundreds of years in the West."

"The public health and social policy implications of the relations among health, air pollution, and poverty are likely to be important, especially in areas such as Asia, where air pollution concentrations are high and many live in poverty"

—Health Effects Institute report *Outdoor Air Pollution and Health in the Developing Countries of Asia*

This rapid growth has left governments in the region struggling to keep their skies clean. Few Asian countries have systematic air quality management programs that allow governments to set standards, implement broad-based programs, and monitor results, states the 2010 report *Outdoor Air Pollution and Health in the Developing Countries of Asia*, by the Health Effects Institute in the United States.

Though there are a few bright spots in terms of controlling vehicle emissions, most parts of Asia still have old, high-polluting vehicles on their roads. Many of these vehicles run on poor quality, "dirty" fuel. Retrofitting modern pollution control systems, such as catalytic converters on vehicles must be done in coordination with the phasing out of low-grade gasoline and diesel. This is a huge task for any city or rural area. Rapidly expanding numbers of private vehicles throughout

FOUR-STROKE SAVINGS

In the Philippines, many people travel short distances around the city on motorized tricycles. They are cheap, popular, and powered by two-stroke engines, one of the most polluting types of combustion on the road. The deadly white smoke a single two-stroke tricycle emits can pollute more than an entire bus. The more modern four-stroke engines run cleaner but they are expensive, which makes the drivers less inclined to upgrade. A project in the Manila-area city of Mandaluyong addressed this issue using microfinance. Tricycle drivers were lent enough money to buy a four-stroke bike if they agreed to give up their two-stroke engine. This created a 40% saving in fuel, part of which could be used to pay back the loan. Several drivers in the pilot project have already paid back their loan in full and now project administrators are looking to scale up the effort to other cities in the country. The drivers recognized that cleaner engines were also healthier for themselves and their community, say project organizers. ■

WIN-WIN DEAL A city in Manila is offering tricycle owners easy financing to convert their two-stroke engine to a four-stroke engine, which consumes less fuel.

the region compound the problem further.

Complicating the situation is the fact that in many countries in Asia, there is a clash of interest in the government agency responsible for addressing air pollution, says Punte.

"There is a perverse incentive to avoid air quality monitoring," she says. "The agency mandated with addressing air quality problems—usually the environment ministry in a country—is also the monitoring agency. If they monitor properly, and find high levels, they are burdened with extra work and responsibility in solving the problem they identified. So the incentive is to provide weak monitoring. What is their incentive to find problems that they must then correct?"

Against this backdrop, the region must also address a variety of other sources of air pollution, such as open burning of trash and other materials, emissions from combustion of low-quality indoor fuels, and large numbers of unregulated small businesses and industries.

As these issues are addressed, the benefits to the global climate change situation stand to improve as well, experts note. Reducing local air pollution reduces carbon emission and thus mitigates climate change.

"If someone is hit by a car, they know why they died, but if someone has a stroke or a heart attack, how do you know if it was caused by air pollution?"

—Sophie Punte, executive director of the Clean Air Initiative for Asian Cities

QUANTIFYING THE HEALTH IMPACT

The region's rapid growth without adequate air quality management systems in place has made Asian cities some of the least healthy places in the world to live. In 2000, the last time a global study was done on the matter, the World Health Organization (WHO) found that two-thirds of the estimated 800,000 deaths and 4.6 million lost years of healthy life worldwide caused by exposure to urban air pollution occurred in the developing countries of Asia.

Despite the disturbing overall estimates, data on health effects of air pollution in Asia are seldom directly useable by policy makers, says Punte. This gap between research and policymaking limits the abilities of politicians to make the hard decisions needed to address air pollution.

"If someone is hit by a car, you know why they died, but if someone has a stroke or a heart attack, how do you know if it was caused by air pollution?" asks Punte. "The damage is shared and less visible. If people on average die 1 year earlier, how do you know if that is due to poor air quality?"

A study linking declining health and air pollution in Ho Chi Minh City, Viet Nam has provided some of the best evidence yet that dirty air puts people into the hospital, and sometimes into the grave.

The study, conducted between 2003 and 2005, examined admissions of children under the age of 5 at the two main pediatric hospitals in the city. It looked at all children of this age admitted for acute respiratory illness.

"Nearly all children admitted for respiratory illnesses in (Ho Chi Minh City) are hospitalized in one of these two pediatric hospitals," a summary of the report notes. "Thus, we captured nearly all children's admissions for acute respiratory illness."

The preliminary results of the study were startling. When looked at on a chart, the line illustrating the number of pediatric hospital admissions for

AT HIGH RISK Schoolchildren cross a busy street in Pakistan. The World Health Organization says some of the hardest hit by poor air quality are people living near major roadways.

PICTURE CREDIT: AFP

respiratory problems and the line showing the day's increase in air pollution run on very similar paths. There was variation between rainy and dry seasons, but the conclusions indicated by the data were compelling.

"Increased concentrations of air pollutants… are associated with increased hospital admissions for acute lower respiratory infection in young children of Ho Chin Minh City, particularly in the dry season," states the report, which was financed by the Asian Development Bank and Health Effects Institute.

Though the Viet Nam study did not examine the poverty levels of the children admitted to the hospital, it is likely that most of them were poor. According to a broader study on the impact on health of air pollution, there is increasing evidence that poverty compounds the likelihood of suffering from medical conditions related to poor air quality.

"Economically disadvantaged communities are exposed to higher concentrations of air pollution," states the recent Health Effects Institute report. "Because of poorer nutrition, less access to medical care, and other factors, people in these communities experience more health impact per unit of pollution exposure."

The comprehensive 284-page report notes that low levels of education, low family income, and residence in a poor neighborhood are all risk factors for developing health problems associated with poor air quality.

"The public health and social policy implications of the relations among health, air pollution, and poverty are likely to be important, especially in areas such as Asia, where air pollution concentrations are high and many live in poverty," the report states.

Some of the hardest hit by poor air quality, according to the WHO, are "people living in poverty worldwide who use dirty biomass fuels for indoor cooking and heating, as well as those who reside or work in close proximity to major roadways."

CONVERTED A garage worker installs a natural gas tank to a vehicle in Bangkok.

MIDDLE-CLASS DEMANDS

In the last 3 decades, Thailand's capital city of Bangkok underwent a transition common in Asia. As the economy expanded, vehicle ownership grew rapidly. The number of motor vehicles registered in Bangkok soared to more than 5.6 million in 2007 from 600,000 in 1980. As expected, this was followed by a significant increase in gasoline and diesel fuel consumption.

In cities throughout prosperous East Asia, the situation has repeated itself. Incomes, vehicle ownership, and fuel usage increase. Smog-filled skies soon follow.

But in Bangkok, that was not the case. While vehicle ownership and fuel usage increased, the government implemented emission control strategies and effective air pollution monitoring systems that improved the city's air quality over time.

The city obtained this result by enforcing vehicle emissions standards, particularly the installation of catalytic converters as well as incentives for drivers to phase out two-stroke engines, which are some of the highest polluting vehicles on the road. The government also mandated inspection and maintenance programs, as part of vehicle registration, and police conducted roadside checks on vehicles emitting smoke.

As these measures were implemented, roadside monitors directly reflected corresponding decreases in air pollution.

In Bangkok, another dynamic was also at play. The expanding economy did not only increase vehicle ownership and fuel consumption, it also increased the size of the middle class, which demanded a cleaner environment. This phenomenon is a powerful driver of change throughout Asia and the world, says Punte.

"Once you reach a certain level of wealth, you find greater concern for the environment and we're finding that in Asia now," she says. "As Asian economies grow, the pressure increases for governments to address air quality issues. A growing middle class will demand better public spaces, improved 'walkability' in urban areas and a better quality of life.

"Clean air is an important part of that." ■

Murky Water

Water pollution threatens millions in Asia but innovative solutions are being found

BY Jade Lee-Duffy and Karen Emmons

After a heavy rainstorm in June, farmers around the townships of Qujing City in Yunnan Province in the southwest People's Republic of China's (PRC), woke to a disturbing scene. Their goats, sheep, horses, and cattle lay dead on hillsides. The livestock had consumed water tainted by toxic waste.

An investigation found that a local company had hired truck drivers to dispose of the waste at a treatment plant in the bordering Guizhou Province. To save on transport costs, the drivers instead unloaded the heavy-metal-laden slurry near a reservoir in Qujing's rural areas. The rain washed the toxic sludge into a tributary of the Pearl River, one of the country's extensive river systems.

No human deaths or injuries were reported, but the waste turned the water in a nearby reservoir yellow and villagers up and downstream became afraid of all water.

According to one of the world's foremost water experts, a man who advises prime ministers and the United Nations, people in developing countries have many reasons to fear their water—beyond the reckless disregard of truck drivers.

Asit Biswas believes the planet is choking on water pollution but that water quality "has disappeared from the radar as a critical environmental issue," according to an editorial he cowrote that appeared in the *Bangkok Post* in June 2011. He also believes water experts, the media, and other influential sectors unnecessarily focus on a coming water crisis from the angle of physical scarcity.

"If there is a water crisis in the future, it will not be due to physical lack of this resource but because of its quality which is deteriorating continuously in nearly all developing countries," he wrote with his wife, Cecilia Tortajada, in the May 2011 issue of *Asian Water.* Both water experts founded the Third World Centre for Water Management in Mexico and are visiting professors

FISH KILL **Workers remove over 50,000 kilograms of dead fish from the Donghu lake in Wuhan in 2007. The People's Republic of China admitted in 2010 that water pollution in 2007 was twice as bad.**

PICTURE CREDIT: AFP

at the Lee Kuan Yew School of Public Policy in Singapore, among a variety of prominent positions. In 2006, Biswas, who was born in India, was awarded the Stockholm Water Prize.

Biswas and his wife are not the only water experts speaking out about quality issues. A recent report from the Asian Development Bank, *Greening Growth in Asia and the Pacific,* notes that the precarious water situation will further be complicated by climate change.

"Many large Asian river basins are particularly vulnerable to regional warming, given the critical role of glaciers and snowfields that serve as 'water towers,' in supporting dry season and drought year flows upon which hundreds of millions of Asians depend," the report says. "Climate change is also warming water in large lakes in the region. In past decades, temperatures have increased by 0.45°C on average, which, while seemingly modest, can have dramatic effects on water quality and ecosystems in lakes. Further warming could result in rapid biodiversity loss in freshwater ecosystems."

"If there is a water crisis in the future, it will not be due to physical lack of this resource but because of its quality which is deteriorating continuously in nearly all developing countries"

—Asit Biswas, founder of the Third World Centre for Water Management in Mexico

GARBAGE DUMP A boy throws garbage into the already polluted Yamuna river in New Delhi. The river has become a liquid garbage dump with 3 billion liters of waste and raw sewage (over half of the city's daily waste) pumped into the 1,300-kilometer river every day, choking most of its aquatic life.

"The statistics on water pollution paint a grim picture—approximately 40% of [the PRC's] waterways are Grade IV to V+, meaning that the water is unsuitable for drinking, industry, or agriculture," wrote Jennifer Turner, director of the China Environment Forum at the Woodrow Wilson International Center for Scholars, Washington D.C., in Asia Society's *2006 Water Security Report.*

One of the report's writers, Upmanu Lall, director of the Columbia Water Center at Columbia University in New York City, says he suspects the situation is worse in India, much better in the Republic of Korea and Japan and somewhere in between among Southeast Asian countries.

The *Challenges to International Waters—Regional Assessments in a Global Perspective* report declares that water pollution along with freshwater shortage are two of five "serious worldwide problems that are expected to increase in severity by 2020." The assessments used eight transboundary indicators when looking at pollutants: suspended solids, eutrophication (excessive nutrients in aquatic systems caused largely by sewage and fertilizer runoff), microbial pollution, solid wastes, chemical pollution, oil spills, radionuclides, and thermal pollution. The report, produced by the United Nations Environment Programme, also attributes the root causes of pollution to agricultural development, population growth, urbanization and industrialization, and market and policy failures.

According to the UN, pollutants include pathogens, organic matter, nutrients, heavy metals (including arsenic) and toxic chemicals, sediments and suspended solids, silts, and salts.

POLLUTERS

Industry is certainly a major polluter, due to both accidents and the direct release of toxic waste into water resources. In the PRC in 2005, an oil company was blamed for an 80-kilometer spill of toxic benzene in the Songhua River that supplies water to Harbin, a city of 4 million people. Elsewhere in the PRC, according to the *Water Security Report,* as of 2006 some 2,800 chemical factories are located around Lake Tai near the PRC's southeastern coast, the country's third-largest freshwater body now "devastated by agricultural and industrial pollution as a consequence of [the PRC's] economic boom and poor management of waste." The report noted that 2 million people had lost access to their primary freshwater source and fish yields, rice production, and tourism had declined.

While industrial accidents and reckless truck drivers get headlines, water experts point to municipal wastewater and agricultural runoff as the main sources of pollution of both surface and groundwater supplies.

In 2010, the PRC government reported that water pollution in 2007 was more than twice as damaging as

official figures originally indicated. Instead of 13.8 million metric tons of polluted discharges into the country's water systems, a total of 30.3 million metric tons flowed into the water bodies that year. The change in numbers was due to the recent inclusion of agricultural waste into the report: agricultural effluents laced with fertilizers and pesticides and fluids leaking from landfills.

In India, large stretches of rivers are dying. New Delhi's Yamuna River has become a liquid garbage dump with 3 billion liters of waste and raw sewage (over half of the city's daily waste) pumped into the 1,300-kilometer river every day, choking most of its aquatic life. To the east, the Ganges River is one of the 10 most polluted rivers in the world. At the northeastern city of Varanasi, the Ganges' fecal coliform levels are more than 100 times the official Indian government limit.

In the Philippines, densely populated areas have created highly polluted bodies of water. In the four urban areas of Metro Manila, Central Luzon, Southern Tagalog, and Central Visayas, approximately 58% of sampled groundwater was contaminated with coliform bacteria and required treatment.

Treatment, however, is poor across the region as it is around the world. Research by the Third World Centre for Water Management in Latin America found that 10% of wastewater point sources (such as sewage and industrial effluent outfalls) had proper treatment facilities, and Biswas has estimated the situation was similar in Asia's developing countries.

In terms of controlling what are known as non-point sources of pollution (diffused sources such as runoff), Biswas writes that "the record of developed countries is poor, and that of developing countries… abysmal." The source of this type of pollution source is primarily agricultural activities, such as the use of pesticides and chemical fertilizers (although human waste due to open defecation is a serious problem also).

About a billion people still lack safe drinking water and the Millennium Development Goal targets halving that number by 2015. But the *Water Security Report* raises a flag, contending there has been "a focus on ensuring adequate supplies of water without appropriate consideration for water supply safety and security, water treatment and disposal, and demand management." The result, the report says, "is dependence on increasingly contaminated water sources."

According to the United Nations Children's Fund (UNICEF), only 53% of Indonesia's population in 2004 obtained water from sources that were more than 10 meters from a waste disposal site. In Jakarta alone, fecal coliform was found in 84% of shallow well samples.

Climate change is exacerbating many of these situations. Particularly in developing countries, where governments have limited human, institutional, and financial resources, the negative impact of torrential rains, rising sea levels, cyclones, and flash floods adds additional challenges to safe drinking water and improved sanitation for both groundwater and surface water supply.

LOW-COST SOLUTIONS **A farmer plants saplings at paddy fields on the outskirts of Hyderabad, India. To prevent the pollution of water by agricultural runoff, the Columbia Water Center in New York is testing the use of low-cost tools that helps farmers minimize the application of fertilizers and pesticide.**

PICTURE CREDIT: AFP

IMPACTS

When he thinks of water pollution, Lall says he thinks of cancer impacts and the loss of biodiversity: the loss of aquatic ecosystems and food sources (fish in particular), disease (high incidence of cancer, blue baby syndrome, blindness, and maternal and infant mortality) and economics (treatment costs for drinking water are inordinately high for the polluted water).

A World Bank study found that PRC farmers were almost four times more likely to die of liver cancer and twice as likely to die of stomach cancer compared with the global average. Lall says "cancer villages" are also evident in India's Punjab state.

CONVERTING WASTE INTO ENERGY
A man cooks his meal on a biogas-powered stove in Yunnan, the People's Republic of China. A company has set up the province's first large-scale biogas digester, which treats up to 150 tons of pig waste a day.

While Biswas and his wife find that anecdotal evidence also indicates that the health and environmental costs of water-quality deterioration are already in the billions of dollars each year, other experts find the human cost to be deadly. Diarrhea contracted from sewage-contaminated water is one of the biggest killers in the region. The World Bank estimates that diarrhea kills about 110,000 Bangladeshi children younger than 5 years every year. Dirty water is one of the leading causes of death for children in India, according to the World Health Organization.

POTENTIAL SOLUTIONS

Although Biswas wrote in the *Asian Water* commentary that "there are no signs that governments and people are aware of the seriousness of this problem and the dangers they pose to human health and ecosystems," there are many reports of innovations in pockets of Asia working to better manage the problem.

In India, most sewage treatment plants suspend operations for months at a time due to power cuts and erratic floodwaters. A Hindu priest and professor of hydraulics and water resources engineering, Veer Bhadra Mishra, won approval and support from the government for a gravity-operated pilot sewage-treatment program that aims to remove waste and disease from the Ganges River. Mishra's cheap, sustainable system uses the gradient, instead of electric pumps, to divert sewage into four big pools outside the city of Varanasi, where harmful pollutants are broken down by algae, bacteria, and sunlight. Most treatment plants along the Ganges River only remove solid waste and not microorganisms.

The Huijia Peike Pig Breeding Company set up Yunnan Province's first large-scale biogas digester. The company's large anaerobic digester treats up to 150 tons of pig waste a day, generating an average of 250 cubic square meters of biogas. The energy is used to power the on-site facilities, and the surplus is diverted, at no cost, to 42 households nearby, where they will save about $92 annually in fuel costs. This eco-friendly process removes about 90% of livestock pollutants that would otherwise end up on nearby farmland and in waterways.

Lall and his group of researchers at the Columbia Water Center are working on strategies that confront the pollution of water by agricultural runoff. One solution involves the use of very cheap and simple sensors to detect soil moisture and the presence of the wetting front during irrigation, and nitrate in the soil water, so that the timing and depth of irrigation, and the need for application of fertilizer and pesticide can be determined by the farmer in the field and hence reduce the amount used, save money, and also reduce pollution. As the climate changes, this approach would provide an adaptation strategy by tuning to the changing conditions.

"In our experiments with 6,000 or so farmers, one can easily save 30% of water this way and recruiting and training farmers does not require a transformation," Lall says. His research group is working in Brazil, the PRC, India, Ethiopia, Mali, and the United States, where agricultural pollution is also a huge problem. In Asia, he adds, "the problem is exacerbated by the monsoon—high-intensity rainfall that is episodic leads to a high rate of wash-off of fertilizer and pesticides and a reapplication, thus creating a cycle of pollution that is hard to manage."

Environmental activism, though hardly innovative, is popping up in unexpected places. *Discover* magazine reported that more than 3,500 environmental organizations now have legal status in the PRC. "Through a program called the Green Choice Alliance, environmental groups publish lists of companies in violation of environmental regulations and offer to conduct a third-party audit if a company chooses to clean up its act," says the magazine in March 2011.

Biswas recently applauded a new resource for innovative solutions. The Asian Institute of Technology in Thailand is setting up the Asian Water Research and Education Center with experts from different disciplines looking to find Asia-specific solutions to Asia's water problems, current and future.

"If the proper management of water quality continues to be neglected," Biswas concludes in his *Bangkok Post* editorial, "there is no question that the world is likely to face a water crisis." ■

Cambodia Goes Green

Cambodia has aggressively embraced the concept of green growth but serious challenges lie ahead

BY Karen Emmons

Ley Leup has been a rice farmer all of her life. The 56-year-old resident of northern Cambodia tried to grow vegetables, which generate greater profit, but the high cost of fertilizers and pesticides kept her income so low that she gave up.

In the last few years, things have changed. She has undergone government training that has taught her how to improve her seed selection, use waste from around her farm as organic fertilizer, and deter pests without chemical pesticides. Today, the cabbage, morning glory, string beans, asparagus, and cauliflower that she grows on her farm are far more profitable than rice and she makes a much more comfortable living.

When asked if she is an organic farmer, she says: "I don't know, but the traders pay more if I don't use chemicals on my vegetables so I don't use them."

Ley Leup is one small example of a broader movement underway in Cambodia to bring green and sustainable practices without sacrificing economic growth.

Though a small country, Cambodia is working to establish itself as a leader in the emerging practices of green growth—the balancing of economic expansion and environmental preservation.

By some accounts, Cambodia's efforts to green its economy began in a workshop for government officials in 2007. At that meeting, Raekwon Chung,

TEAM EFFORT A dragon boat team paddles in unison along the Tonle Sap river during the Water Festival in Phnom Penh. Cambodia formed an interministerial working group to develop a strategy for the greening of its economy.

PICTURE CREDIT: AFP (DRAGON BOAT), CONOR WALL (LEY LEUP)

an environmental pioneer, talked about the concept of green growth. He remembered that Mok Mareth, senior minister and minister for environment, in particular was keenly interested. Chung, the director of the Environment and Development Division of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), encouraged the Cambodians to consider taking the concept further.

Chung, a Korean, told the Cambodians that the only way they could go forward was to bring in senior officials from many ministries, most especially those with the clout to sink or float ideas, such as finance, planning, and industry.

Chung was telling everyone at that time—as he still does, passionately—that the current growth pattern of the region is energy-, resource-, and carbon-intensive, and that the region will be hardest hit by the looming energy, resource and climate crises. Caring about the environment, explains Chung, means using it efficiently, which in turn leads to economic efficiency and continued growth.

> **"We want to show the world this is possible—to create a new way of growth that will allow Cambodia to enhance economic growth while also preserving and promoting its environment and rich ecosystems"**
>
> **—Jieun Lee, a program officer with the Global Green Growth Institute**

According to Koch Savath, deputy director-general of Cambodia's Ministry of Environment, having lived through a "black regime" in the 1970s when infrastructure was decimated and human resources destroyed, he and other Cambodians were afraid of the prospects of similar destruction of their natural resources.

SMART FARMING Ley Leup, a 56-year-old rice farmer, is making more profit from raising pesticide-free vegetables. She is one small example of a broader movement underway in Cambodia to bring green and sustainable practices without sacrificing economic growth.

The Cambodians knew their forest cover was dwindling fast and they had huge problems with waste management. They also knew that as a least-developed agrarian country, they were highly vulnerable to climate change impacts.

As green growth was being introduced, Cambodia also was constructing its first national program of action on adaptation to climate change. Says Hak Mao, chief of the Climate Change Vulnerability Assessment and Adaptation Office within the Ministry of Environment, everything was pointing to the need "to develop in a sustainable way" and improve the country's resilience.

LOW-CARBON AND GREEN-GROWTH MODEL

The ESCAP approach to low-carbon green growth and its technical guidance were an offer that Hak Mao says the government would "never regret." By following the ideas that Chung and others encouraged, the country could sustain its natural capital and grow the economy.

"The ESCAP green growth concept promotes changes to the economic system to close the gap between economic efficiency and ecological efficiency, shifting from the energy-, resource-, carbon-intensive growth pattern toward an efficient growth pattern—a critical strategy for coping with the looming multiple crises," says Chung. "These changes include the change of the invisible structure of the economy, such as market price, regulation, social values, lifestyle and technology, and the changes of the visible infrastructure, such as the design of city, building, transport, energy, water, and waste systems."

Although less of an easy sell outside Cambodia's environment ministry, partly because so few people had ever heard of green growth let alone understand why it should involve them, Mok Mareth and Koch Savath eventually brought every government ministry into an interministerial green growth working group.

In time the working group became impassioned about green growth and what Cambodia could achieve, explains Aneta Nikolova, an ESCAP environmental affairs officer who is part of a capacity-building team that Chung created to help policy makers in the region understand how to develop green growth policies and apply the concept to their context.

EMPOWERING CONSUMERS **A family eats dinner on the floor in front of a portable lamp during a power outage in Phnom Penh. A pilot project in Cambodia aims to give villagers a low-cost, clean energy option by training them to manage solar-powered recharging stations for rechargeable lamps.**

After training Cambodian trainers, the capacity-building team and the working group over the span of 2 years, half a dozen seminars, and funding from the Government of the Republic of Korea put together an exhaustive strategy, right down to possible jobs, for the short-, medium-, and long-term greening of Cambodia's economy.

"We made them dream and see the horizon," says Nikolova.

ILLUMINATING WHAT IS POSSIBLE

They also showed them how to illuminate those dreams (both figuratively and literally) by including a demonstration project to illustrate the pro-poor green business model and how to put it into practice. The project introduced an innovative, clean, safe, affordable, and of course environment-friendly way to light up floating villages.

Cambodia is heavily dependent upon energy imports and lacks a nationwide electricity transmission system. Those who can access the grid pay dearly for the unsteady supply. Much of the country otherwise is dependent on expensive, dirty, unreliable, or potentially dangerous sources for energy, heat, and light, including portable generators, kerosene lanterns, and lead-acid batteries. Through a pilot partnership with Sunlabob Renewable Energy, the Cambodian Renewable Development Team, the National Green Growth Secretariat of the Ministry of Environment of Cambodia, and the Korean International Cooperation Agency, a low-fee rental scheme for rechargeable lamps and solar-powered recharging stations were made available to residents in two floating villages in Battambong Province. The villagers were trained to maintain the scheme, giving them energy independence. The plan is to use the lanterns as a model for future pro-poor green business projects both in provincial Cambodia and in other developing countries.

Cambodia has also tried to rev up interest in innovative technologies, such as producing biogas energy at a small scale. A garments factory currently operates from energy produced from rice husk gasification.

In early 2010, a senior representative from every ministry met at a roundtable event to endorse what has become a historic milestone in regional efforts toward implementing green growth.

A few months later, the Global Green Growth Institute (GGGI) was set up in Seoul to help developing country governments create green growth strategies. Although somewhat ahead of the game but still needing immense technical and financial assistance, the Cambodians asked GGGI for help to apply the road map.

Reading more like an environment-friendly shopping list, the road map is certainly heavy on zeal. It contains 37 priorities that address what it calls the seven access areas. The emphasis is on green economic growth projects and programs, including eco-efficient and resource-efficient innovations that can create opportunities and new green jobs.

The document states "while an instant paradigm shift toward green growth is not to be expected," it is looking for "an economic growth model that is more conducive for human development, resilience, and environmental sustainability than the current business-as-usual approach."

IMPLEMENTING THE ROAD MAP

Despite the impressive beginning, there is yet no formal policy in place. Additionally, awareness of green growth or even of the road map remains extremely limited within the private sector and the general public.

There are some promising projects underway, implemented with international donor support, including efforts to make rice farmers more resilient to climate change and encourage small farmers to adopt sustainable practices and diversify agriculture.

It will likely take several years to implement such a policy in Cambodia on a broad scale, says Koch Savath. He notes that it takes time to convince

PICTURE CREDIT: AFP

people of the importance of sustainable practices and to develop the political will to make green growth the policy.

The Cambodians, says Jieun Lee, a program officer with GGGI, "are not afraid of learning. They're not afraid of potential hurdles that lie ahead no matter how large. They know it's a long road and they will have to work hard to achieve success."

GGGI and the Government of Cambodia are in the process of developing a national green growth master plan for building up the country's capacity to go green. According to Lee, the government has committed to pursuing a more sustainable model of growth to alleviate the strain placed on its environment and natural resources. The master plan seeks to establish a national committee on green growth to oversee the work to be done, a green growth policy, and a regulatory framework. The priority sectors that will be addressed first are sustainable forestry, waste management, and green job creation. The master plan also has room for intensive analysis of economic and institutional potential, training for government officials and local experts, and raising public awareness.

GGGI wants to assist Cambodia to create jobs and new options for economic growth while learning from the Republic of Korea's experience, Lee says, referring to the Korean economy that grew into an industrial power from a garments export beginning but has been facing issues of air pollution and other environmental problems. Specifically, the Republic of Korea can transfer the know-how and capacity generated through the creation of concrete policies and institutions, she says.

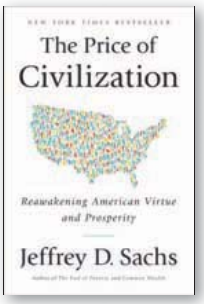
Can Cambodia lead the way for developing countries? Drafting legislation is the next big step. The lifestyle changes may take longer. With all government employees above a certain level entitled to a ration of free petrol and some young civil servants feeling the need to drive a Lexus to be taken seriously, more environment-friendly transport still looms as a dream on the horizon.

Adding that she's excited by what has started in Cambodia, Lee concludes, "They have potential to be a great example to the rest of the world. It's a new field. We're opening markets and opportunities. We want to show the world that this is possible—to create a new way of growth that will allow Cambodia to enhance economic growth while also preserving and promoting its environment and rich ecosystems." ■

The Price of Civilization

The Price of Civilization

By Jeffrey Sachs
Random House, October 2011, $27.00



In his latest book, Jeffrey Sachs, one of the world's leading development economists, offers a diagnosis of the economic crisis in the United States, tracing the root of the problem to "the decline of civic virtue among America's political and economic elite."

Sachs is the director of The Earth Institute and professor of health policy and management at Columbia University. He is also special advisor to United Nations Secretary-General Ban Ki-moon.

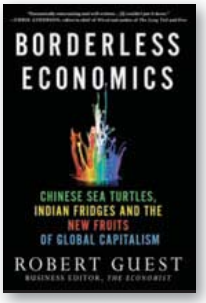
"This is the latest in a spate of books provoked by the world economic crisis and one of the best… In *The End of Poverty* he applied his clinician's skills to the distempers of Africa; in this book he turns them to the hubristic and wasteful habits of America. The details of the Fall—if by that he means the collapse of the American banking system in 2008—do not concern him; it is what the Fall tells us about contemporary American capitalism."—*Robert Skidelsky, The Guardian*

"Sachs manages to paint an alarming picture of the US, while leaving the reader with a sense that its problems are eminently fixable. A second achievement is the sheer sweep of his analysis, which flouts the boundaries of economics to encompass politics, psychology and moral philosophy. The gain in perspective mostly outweighs the loss in authorial authority."—*Martin Sandbu, Financial Times* ■

Borderless Economics

Chinese Sea Turtles, Indian Fridges and the New Fruits of Global Capitalism

By Robert Guest
Palgrave Macmillan, November 2011, $27.00



In *Borderless Economics,* Robert Guest, business editor of *The Economist,* argues that "the free movement of people makes the world richer, accelerates technological progress, and helps disseminate good ideas, from genomics to democracy."

Guest notes that migrants create value in their adopted country through the network of contacts that they build and maintain, thanks to cheap travel and cheap communications, such as through Skype. For instance, Indians in the United States collaborate with their colleagues in India to produce $70 fridges and $300 houses. In the meantime, migrants also help boost their homeland's economy through remittances and knowledge transfer. Known as "sea turtles," Chinese who study in the West and then return home share what they have learned, including, the author hopes, democratic ideas.

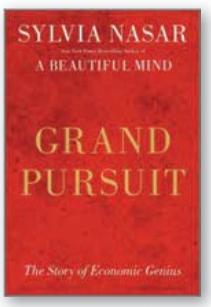
Before joining *The Economist,* Guest was the Tokyo correspondent for *The Daily Telegraph.* He also wrote *The Shackled Continent* in 2004, which discusses the problems facing Africa.

"In this highly readable and personal account built on interviews with emigrants from many countries, Guest… contends that voluntary emigration almost always benefits the emigrants and usually benefits their countries of origin and destination, too. In recent decades, Chinese and Indian overseas diasporas have played a crucial role in generating rapid growth in their home countries, as their members have created businesses and opened foreign marketing channels."—*Richard N. Cooper, Foreign Affairs* ■

Grand Pursuit

The Story of Economic Genius

By Sylvia Nasar
Simon & Schuster, September 2011, $35.00



Author of the bestseller, *A Beautiful Mind,* Sylvia Nasar writes another book on not just one but several "geniuses" in modern history.

Grand Pursuit is about the men and women who transformed economics from a dismal science to "an instrument of mastery" that can improve the human condition.

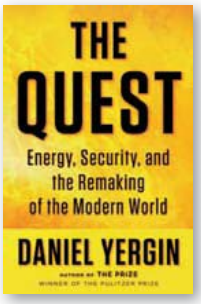
Nasar's account begins with Charles Dickens and Henry Mayhew in mid-19th-century London. "Before 1870, economics was mostly about what you couldn't do. After 1870, it was mostly about what you could do," she writes in the preface. The last chapter of the book is on India's Nobel Prize winner Amartya Sen.

Nasar is the John S. and James L. Knight Professor of Business Journalism at Columbia University.

The Quest

Energy, Security, and the Remaking of the Modern World

By Daniel Yergin
The Penguin Press, September 2011, $37.95



The Quest continues the story begun in Daniel Yergin's Pulitzer Prize-winning history of oil, *The Prize*. The new book draws on 5 years of research to provide a comprehensive analysis of the global energy market and the dynamics shaping its future.

"The quest to secure the energy future will play out across the entire spectrum of energy—from traditional sources like oil and gas to renewable energy and improvements in efficiency—and, as history shows us, a healthy dose of human ingenuity," says Yergin in a press statement.

Yergin is a recipient of the United States Energy Award. He is chairman of Cambridge Energy Research Associates (CERA).

"An even better book [than *The Prize*]. It is searching, impartial and alarmingly up to date…. Mr. Yergin brooks no cant about climate-change denial, and lingers on the topic of cleaner future fuels. Our heads may be buried in our sleek laptops and gadgets, his masterly book announces, but our toes are still soaking in dirty, morally contaminated oil."—*Dwight Garner, The New York Times*

"It is, first, an account of the many ways in which people have sought to produce energy—by burning fossil fuels, harvesting the wind, brewing biodiesel and trapping the sun's heat. It is also an analysis of the increasingly fraught political context in which this business is conducted, especially with regard to three big and longstanding fears: energy scarcity, energy security and, more and more, the environmental ruin that energy can cause. *The Quest* is a masterly piece of work and, as a comprehensive guide to the world's great energy needs and dilemmas, it will be hard to beat."—*The Economist* ■

"Nasar's aim… is not to write intellectual history but to put the reader into the lives of the characters of a sweeping historical drama that extends from Victorian England to modern-day India. That she largely succeeds reflects the depth and breadth of her research but also the elegance of her prose."—*Steven Pearlstein, The Washington Post*

"At the core of Nasar's narrative is an account of the economically troubled decades between the two world wars, as told through the experiences of Keynes, Irving Fisher, and Schumpeter and Hayek.… The book as a whole is made up of so many wonderful parts that one is inclined to excuse its shortcomings."—*Justin Fox, The New York Times*

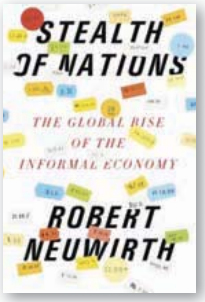
"If Nasar puts perhaps too much emphasis on the influence of early economic thinkers—who, after all, were observing conditions rather than creating them—she does show how fully the profession has become entwined with the way governments run.… Much of *Grand Pursuit* may be a reminder that as bad as things seem now, they have been worse—much worse—and that those difficult times can shed light on what is happening today."—*Alana Semeuls, Los Angeles Times* ■

Stealth of Nations

The Global Rise of the Informal Economy

By Robert Neuwirth
Pantheon, October 2011, $25.95

After writing about the world's 1 billion informal settlers in *Shadow Cities*, Robert Neuwirth focuses his attention on the informal economy, estimated to be worth $10 trillion. The book's title, *Stealth of Nations*, is a wordplay on Adam Smith's *Wealth of Nations*.



Neuwirth notes that the informal economy, or System D (a term that originated in Francophone Africa and the Caribbean), is "based on small sales and tiny increments of profit, yet it produces, cumulatively, a huge amount of wealth. It is massive yet disparaged, open yet feared, microscopic yet global."

Neuwirth has written for *The New York Times*, *The Washington Post*, *Fortune*, and *Wired*. His first book *Shadow Cities: A Billion Squatters, a New Urban World* was published by Routledge in 2004.

"A valuable book because it challenges conventional thinking about what it means for an economy to develop…. Mr. Neuwirth argues that System D [the underground economy] fosters entrepreneurship while also meeting governments' needs to encourage employment; in some cases, a modest amount of tax revenue is also generated. Moving into the 'formal' sector, he suggests, may not be a goal to which entrepreneurs in poor countries aspire."—*Marc Levinson, The Wall Street Journal* ■

Good Investment

Investors willing to accept below-market returns to achieve positive social change are a rising force in global development

BY Gregg Jones

In late May, in what has become an annual event, more than a dozen graduate business students from the United States spent 10 days in Kenya, talking shop with grassroots entrepreneurs and observing firsthand the power of free-market innovation and private-sector investments in fighting poverty.

Around the same time, 650 corporate executives, fund managers, investors, academics, and ordinary citizens from more than 50 countries gathered in the Netherlands to discuss how impact investing can lift living standards and reduce environmental problems around the world.

From Asia to Africa, from the Americas and Europe to the Middle East, the deployment of patient capital by investors willing to accept below-market returns to achieve positive social change is a rising force in global development. Combining the idealism of traditional philanthropy with the innovation of free markets, these pioneering social capitalists are partnering with local entrepreneurs to manufacture antimalarial mosquito nets in Tanzania, deliver electricity to slum dwellers in India, and irrigate parched farms in Pakistan, to name just a few projects—all while striving to turn a profit.

Their shared goal, says Kevin Jones, founder of a San Francisco, California-based impact investment firm known as Good Capital and the annual Social Capital Markets Conference, is "investing with a desire for clear, measurable social and environmental impact."

In the last 4 years alone, more than 100 new funds with the stated goal of investing for social good have emerged. Tens of millions of dollars from these funds and more established players, such as the Acumen Fund, are delivering positive change to millions of poor in the developing world.

"I don't think anybody who takes these problems seriously will say we can solve everything with [traditional development] grants, or that we can solve everything with the markets," says Sasha Dichter, director of business development at Acumen Fund. "We should ask what tools are there in the chest to solve this particular problem, and figure out which ones to apply."

PICTURE CREDIT: JUPITERIMAGES, AFP (INDIA)

CLEAR VISION **A student draws graffiti on a wall in Bangalore as part of an eye donation campaign. New York-based Acumen Fund supported the development of a low-cost lens in India that could be implanted in the eyes of patients blinded by cataracts.**

COLD-EYED WALL STREET APPROACH

At the vanguard of the social capital movement is the New York-based Acumen Fund, a nonprofit venture capital firm that invests in enterprises that provide clean water, health care, housing, alternative energy, and other services to low-income people in the developing world. The firm was founded in 2001 by Jacqueline Novogratz, a former Chase Manhattan banker and African microfinance specialist who convinced the Rockefeller Foundation and a handful of other donors to provide seed money for a market-based approach to fighting world poverty.

"I don't think anybody who takes these problems seriously will say we can solve everything with [traditional development] grants, or that we can solve everything with the markets. We should ask what tools are there in the chest to solve this particular problem, and figure out which ones to apply"

—Sasha Dichter, director of business development at Acumen Fund

Acumen Fund's $60 million investment portfolio at the end of the 2011 second quarter supported dozens of enterprises in India, Pakistan, and East Africa.

Novogratz has become perhaps the most recognizable public advocate for market-based solutions to poverty and other social and environmental problems. Her 2009 memoir, *The Blue Sweater: Bridging the Gap Between Rich and Poor in an Interconnected World,* became a *New York Times* best seller. It tells the story of her transformation from rising Wall Street banker to poverty-fighting pioneer.

As a young globe-trotting banker charged with reviewing Chase Manhattan's loans in Brazil and other struggling economies, Novogratz had been troubled by the fact that the bank's doors were "closed to the poor and working class." She began to think how she could use her expertise to improve the lives of the world's dispossessed, and learned about the

INVESTING IN SOCIAL CHANGE **Patient capital investors include eBay founder Pierre Omidyar, who has set up a social investment firm called Omidyar Network.**

pioneering microfinance work in Bangladesh by economist Muhammad Yunus and his Grameen Bank. Back in New York City, she quit Chase Manhattan and went to work for a nonprofit microfinance organization for women, which sent her to Africa. There, she immersed herself in the struggle to overcome poverty.

Over time, Novogratz became convinced that the traditional development approach of throwing money at problems was flawed. The solution, as she saw it, was to invest donations in entrepreneurial enterprises that provided basic services to the poor. It would be a cold-eyed Wall Street approach, with two notable exceptions: greater patience and a tolerance for lower returns.

Acumen's initial investments focused on technology-driven health care efforts in India and East Africa. One of these involved supporting the work of Govindappa Venkataswamy in providing affordable eye care to India's poor, including development of a low-cost lens that could be implanted in the eyes of patients blinded by cataracts—restoring sight, as well as the ability to work.

> **"Through investment, we seek to break the cycle of dependence that aid can create by helping countries build their own institutions and their own capacity to deliver essential services. Aid chases need; investment chases opportunity"**
>
> **—Hillary Clinton, United States Secretary of State**

More recently, the fund's investments have included partnering with an entrepreneur in India whose company is providing safe water to more than 250,000 rural poor, an agricultural products designer whose drip irrigation systems have enabled 275,000 small farmers to double their yields and income levels, and a company in Tanzania that employs more than 7,000 people and produces 16 million lifesaving antimalarial bed nets a year.

Over the past decade, Acumen Fund and other impact investors have fostered dramatic changes in the world of philanthropy.

"A lot more accountability has been built in," says Dichter. "A lot more innovation has been built in. We have a lot more success stories, not just from patient capital but across the board. We have a lot more players coming in. At Acumen, we have put $60 million of capital to work, serving tens of millions of people."

A GROWING FRACTION

Only a fraction of the world's capital is devoted today to impact investments, such as those made by Acumen Fund and its peers. But the space is attracting growing interest and excitement, experts say, and support from such world figures as former US President Bill Clinton, whose Clinton Global Initiative has promoted patient capital as a development tool.

NET INVESTMENT **Social capitalists are partnering with local entrepreneurs in Tanzania to manufacture mosquito nets, a critical tool in the fight against malaria.**

GLOBAL CAMPAIGNER **Foreign Minister Yang Jiechi of the People's Republic of China shakes hands with former US President Bill Clinton at a 2008 meeting of the Clinton Global Initiative, which has promoted patient capital as a development tool among others.**

In 2008, Clinton launched an initiative by LeapFrog Investments, an international microinsurance fund, to place $100 million in Asian and African businesses, providing insurance to the poor—a financial service seen as crucial to lifting people from poverty. After only 18 months, LeapFrog announced in 2010 that it had raised $137 million for its microinsurance investments in Africa as well as India, Indonesia, and the Philippines. Its investors included the Wall Street firm J.P. Morgan, the World Bank, corporate reinsurer Flagstone Reinsurance Holdings, and Omidyar Network, the social investment firm created by eBay founder Pierre Omidyar.

A focal point of inspiration and ideas has become the annual Social Capital Markets Conference, which held its fourth annual gathering last fall in San Francisco. The buzz surrounding SOCAP, as it is commonly known, has grown each year since it began with little fanfare in 2008. The 2009 conference attracted more than 900 participants from 32 countries. The 2010 installment attracted 1,500 participants from 40 countries. The first SOCAP Europe, held in late May and early June 2011 in Amsterdam, the Netherlands, drew more than 650 people from 50 countries.

CHASING OPPORTUNITY

Major development institutions, such as the United States Agency for International Development (USAID), are embracing the possibilities of free-market investments as well. USAID has a Global Development Alliance team that coordinates with private sector corporations and foundations and manages 10 "global frameworks" signed between USAID and private-sector partners.

At leading US universities, graduate students are studying impact investing and the efforts of patient capital-infused entrepreneurs in developing countries.

Lisa Jones Christensen, an assistant professor of strategy and entrepreneurship at the University of North Carolina's Kenan–Flagler Business School in Chapel Hill, recently returned from her annual immersion trip to Kenya, where her master of business administration students saw the real-life results of patient capital at work as entrepreneurs turned trash into cooking briquettes in a Nairobi slum.

"The students learn how other people really live and why we need innovation and entrepreneurship so desperately," says Christensen. "They also see there are a lot of indigenous local entrepreneurs who aren't waiting for us to drop something into their lap, and they see that not all great innovations are coming from the US."

In Washington, DC, Secretary of State Hillary Clinton has acknowledged the work of Acumen Fund and the power of strategic investments in the fight against global poverty. Traditional aid would remain a "vital tool" for the foreseeable future, especially in assisting the victims of natural disasters and other emergencies, she says. But strategic investments would eventually supplant traditional foreign aid, she predicts.

"Through aid, we supply what is needed to the people who need it—be it sacks of rice or cartons of medicines," she said in a speech last year. "But through investment, we seek to break the cycle of dependence that aid can create by helping countries build their own institutions and their own capacity to deliver essential services. Aid chases need; investment chases opportunity." ■

PICTURE CREDIT: AFP; EYEPRESS NEWS (YANG JIECHI AND BILL CLINTON)

A Life Examining

Annie Duflo is part of a growing breed of young development professionals who are working to test the effectiveness of development programs

BY Jade Lee-Duffy

On a sunny day in May, a surprise was waiting inside 300 primary schools across the African country of Ghana. Instead of one teacher in the classroom, now there were two. For 2 hours a day, new teaching assistants were going to help youngsters who couldn't read or perform simple additions in math.

Hired through the country's National Youth Employment Program, teaching assistants across 42 rural and urban districts had to be trained to teach learning through playing games, singing songs, and presenting fun, child-friendly material that appealed to all the senses.

The impact evaluation of this remedial education program in Ghana is being led by Annie Duflo, one of the vice-presidents and the executive director at Innovations for Poverty Action (IPA), a nonprofit research organization, based in New Haven, Connecticut. According to Duflo, several developing countries have a large fraction of primary students, aged 6 to 10 years old, that were not learning basic literacy and numeracy skills. The remedial program was targeted to break this trend.

With IPA projects in 46 countries, Duflo's directive is to find out "what works and what doesn't" when it comes to development programs and projects. Through the use of randomized impact evaluations, Duflo and her network of researchers assess whether development programs are cost-effective and yield positive results. She is part of a growing breed of young development professionals who work with economists in partnership with development organizations, microfinance institutions, governments, and poverty alleviation programs to develop and test solutions that aim to improve the lives of low-income families in developing countries.

DUPLICATING SUCCESS **Children play football at a park in Ghana. Annie Duflo (right) has helped Ghana launch its Teacher Community Assistant Initiative by adapting similar successful remedial education programs in India.**

By showing which programs are cost-effective, Duflo and her colleagues are helping to encourage evidence-based programs and policies, and to move much-needed funding toward these programs. As there is a growing concern over the cost-effectiveness of programs, policy makers, governments, and aid organizations are fueling a demand for more impact evaluations to ensure that money for programs isn't wasted.

GIVING A HELPING HAND

Duflo's work in development started in India in 2000. For half a year, she volunteered in the Natural Resource Development unit of Seva Mandir, a

PICTURE CREDIT: AFP (PLAYING FOOTBALL), PHOTO OF ANNIE DUFLO COURTESY OF INNOVATIONS FOR POVERTY ACTION

nongovernment organization (NGO) in the historic city of Udaipur. She then worked at the Jaipur branch of Pratham, an education NGO spread across India. Shortly after, in 2002, Duflo managed a large-scale survey of 100 villages in Udaipur district on health care status and health care delivery, led by researchers at the Massachusetts Institute of Technology (MIT) and Princeton University in collaboration with the NGO Seva Mandir and the World Bank.

From 2005 to 2008, Duflo was the executive director of the Centre for Micro Finance at the Institute for Financial Management and Research in Chennai. There she worked on improving the accessibility and quality of financial services, and encouraging evidence-based policies through research.

Helping others runs in the family. Duflo was influenced by her mother, Violaine, a pediatrician who works with the French-based NGO l'Appel, which supports children of armed conflicts, and her sister Esther, professor of poverty alleviation and development economics at MIT and a founder and director of the Abdul Latif Jameel Poverty Action Lab (J-PAL), which helps determine what types of aid and antipoverty programs work in poor countries.

The IPA's executive director also holds a master's degree in social sciences from l'École des Hautes Études en Sciences Sociales, l'École Normale Supérieure in Paris, and a master's degree in public administration in international development from the John F. Kennedy School of Government at Harvard University.

"My role is to reach out to NGOs and governments and explain to them what a rigorous evaluation is and how using evidence when designing their programs can increase their impact; and to help implement new studies," says Duflo, who grew up in Paris.

Since joining IPA in 2008, Duflo has helped expand the organization's network of researchers to more than 100 from about 40. In the last decade, the demand for rigorous impact evaluations by donors and practitioners has increased tremendously, so having more researchers to lead these evaluations is key. These researchers work closely with IPA's 14 offices in countries, including Ghana, Kenya, Mexico, Mongolia, and the Philippines.

"My role is to reach out to NGOs and governments and explain to them what a rigorous evaluation is and how using evidence when designing their programs can increase their impact; and to help implement new studies"

REMEDIAL EDUCATION IN GHANA

The remedial education program or the Teacher Community Assistant Initiative (TCAI), currently being evaluated by Duflo, is an adaptation of similar successful programs in India conducted by the NGO Pratham, and evaluated by J-Pal. Funded by the United Kingdom-based Children Investment Fund Foundation, the TCAI is being implemented by the Ghana Education Services, in partnership with the National Youth Employment Program (NYEP) and the Ghana National Association of Teachers in collaboration with IPA.

By sharing the results of the impact evaluations, Duflo has helped the government adapt the program from India to fit the Ghana context. "In 2009, we approached the Government of Ghana, met with the teachers' union, the NYEP, and they became interested," she says. "Even though we are convinced that the program works, since it's based on rigorous evidence, we are doing a new impact evaluation in Ghana because the program will always end up being a little different [in another country]. Also, we are evaluating different ways to do the program to understand which one will work best."

The India program revealed it was possible to employ low-qualified tutors to teach students in their own communities basic skills in a relatively short time using a simple methodology and low-cost materials. "The key is to focus instruction at the child's level—and this can be done by having these tutors teach the lower-performing students separately from the rest of the class, for part of the day," says Duflo.

In addition to helping students with essential skills, the TCAI provides employment for the assistants over 2 years, and salaries of about $60 a month from the government's National Youth Employment Program.

One of the program's unknowns is whether it's best to pull students out of class during school hours for additional instruction (and miss part of the regular class) or to wait until after school hours when they may be tired, hungry, and want to go home with their siblings. Duflo says they are trying both options to assess which method is better. "We are also evaluating whether the program can work without assistants by just training the teachers to assist the weakest students,' she adds. A survey was conducted in December 2011 and another in August 2012 will take place to measure if the program has indeed improved learning levels.

If the results of the study are positive, Duflo's goal is to work with the Government of Ghana to help scale up the remedial program, taking it nationally in the future. ■

A Refreshing Development

In remote, impoverished places where clean water and medicine are hard to find, people can still buy an ice-cold Coke

BY Andrew Marshall

In 1988, when Simon Berry was a British aid worker in Africa, he made a connection between two facts that would change his life.

Fact 1: In remote parts of Zambia, where families scratched out a subsistence living by farming, many young children died of preventable diseases, such as dehydration from diarrhea.

Fact 2: In these same rural areas, you could almost always buy Coca-Cola.

That's when Berry, then a technical cooperation officer for the British aid program, made the connection: Could Coca-Cola's unrivaled local distribution networks be harnessed to deliver simple but potentially life-saving medicines to hard-to-reach places?

Twenty years later, in a concerted attempt to answer that question, Berry and his wife Jane launched an independent nonprofit organization called ColaLife. The idea is to leverage Coca-Cola's distribution channels to carry so-called social products—oral rehydration solution (ORS), zinc supplements, water purification tablets—that last mile to save children's lives in developing

PICTURE CREDIT: TIM DENCH/COURTESY OF SIMON BERRY

BENEFICIARIES Two boys in Africa receive an AirPod. ColaLife wants to improve child mortality in remote communities by distributing anti-diarrhea kits through Coca-Cola's extensive distribution network.

countries. In sub-Saharan Africa, one in seven children died before their fifth birthday in 2008, estimates the United Nations.

Initially, Berry thought, one bottle of Coke could be removed from a crate and replaced with a tube carrying the products. But Jane, who says she spent her long evenings in Zambia "reading books on international development to find out why so much good-willed but apparently misguided effort wasn't working," had another idea. "Why don't you make use of the unused space instead?" she told him.

So was born the AidPod: a crush-resistant, wedge-shaped canister that fits snugly between the necks of the Coca-Cola bottles. Ten AidPods fit into a standard crate. "All we're doing is using that unused space to get vital products to the same places as Coca-Cola," says Berry. "We're just piggybacking—making use of a section of the human race who are particularly good at getting stuff to remote places."

It's a neat idea—so neat, in fact, that ColaLife has generated thousands of followers on social networks, such as Facebook, as well as an invitation for Berry to speak at a TEDx community-run event in Berlin in 2010. But will it work? "We didn't want to be remembered as the guys who came up with this cool idea and did nothing about it," he says. "So we gave up our jobs last June [2010] to focus full-time on getting a trial going." The results of that trial, which is planned to take place in Zambia, could have implications for Asia, another vast and often hard-to-access region where reducing child mortality is proving an uphill struggle.

Persuading the world's largest beverage company to even contemplate putting somebody else's stuff in its crates is "a big step," says Berry. What the company calls the Coca-Cola System is a mammoth and well-oiled machine, perfected over a century. While it operates in more than 200 countries, Coca-Cola only makes the concentrates and beverage bases for its soft drinks, and owns and licenses the brands. Nearly 300 local bottling partners produce and distribute the actual products, which are sold through millions of outlets: supermarkets, movie theaters, restaurants, street vendors—pretty much everywhere humanity gathers. Coca-Cola says the world consumes 1.7 billion servings of its products every day.

"The unique thing about the Coca-Cola distribution system isn't the bit from the bottler to the wholesaler, but from the wholesalers onwards. That's where all these independent microenterprises—guys on bicycles, women putting crates on buses, and so on—take over. That's the bit we want to get into"

—Simon Berry, founder of ColaLife

"The unique thing about the Coca-Cola distribution system isn't the bit from the bottler to the wholesaler, but from the wholesalers onwards," says Berry. "That's where all these independent microenterprises—guys on bicycles, women putting crates on buses, and so on—take over. That's the bit we want to get into."

The first ColaLife trial will take the Berrys back to Zambia, the landlocked African country which first inspired them. First, however, together with two other ColaLife supporters, Berry cycled across another country, France, to raise £6,000 to pay for three trips to Zambia. It was critical to first engage Coca-Cola's local bottler, Zambian Breweries, a subsidiary of SABMiller, a global brewing and bottling company with a strong public commitment to sustainable development. The involvement of SABMiller in Zambia means "we might get crossover of the [ColaLife] idea into another huge multinational," says Berry.

ColaLife's other partners in Zambia are the United Nations Children's

Fund (UNICEF) and the state-run pharmaceutical distributor Medical Stores Limited. A local nongovernment organization called Keepers Zambia Foundation will handle the social marketing in the communities, says Berry, "to create buzz and awareness and value around this kit we're going to distribute." ColaLife plans to distribute at least 20,000 AidPods to mothers and caregivers in 30 communities, where most people survive on one or two dollars a day.

"These are sparsely populated areas where the provision of health facilities is very, very low," explains Berry. "There are only 70 registered pharmacies in the whole of Zambia, and these are in the larger towns." However, kiosks selling basic goods—washing powder, cooking oil, biscuits, cigarettes and, of course, Coca-Cola—are common, even in remote areas and they could be tapped to deliver public health products.

AidPods can be adapted to carry a range of products. One of them could be zinc. Given to children with diarrhea, zinc supplements reduce the severity and duration of the illness, and could potentially save up to 400,000 deaths of under-5 globally per year. ColaLife's partners in Zambia want to test the idea by delivering a single product: an anti-diarrhea kit (ADK). "We want to get statistically significant data," explains Berry. "Our main objective at the trial stage is not primarily to save children's lives, but to test whether we can use Coca-Cola's distribution chain to create a commodity that people will have in or very close to their households when diarrhea strikes."

"Much of the world's mortality can be prevented with existing solutions.... So the problem is not so much about what's needed. It's more about how to effectively deliver what is needed to those who need it most"

—Public health advisor Rohit Ramchandani

READY FOR DELIVERY Ten AidPods fit into a standard crate.

Open innovation has also helped the AidPod evolve. If they are made of transparent PET (polyethylene terephthalate) plastic, AidPods might also be used for solar water disinfection—a process known by the abbreviation SODIS. Fill a PET container with contaminated water and leave it in the sun for 6 hours, and the ultraviolet radiation should kill off the pathogens that cause diarrhea. For cost reasons, Berry shelved the idea of producing AidPods from PET plastic. But the Swiss Federal Institute of Aquatic Science and Technology recently sent him samples of a prototype SODIS bag that would fit into a standard AidPod.

ColaLife has raised $1.35 million to date, which will enable it to run the trial with local partners by early 2012. Among the first donors was the Johnson & Johnson Corporate Citizen Trust, which carries out corporate social responsibility activities of the Johnson & Johnson group in Europe, Middle East, and Africa.

The trial's results won't be kept under wraps, but will be published on ColaLife's website so that others might adopt and adapt the idea for their own countries, including in Asia. "We want people to look at what we're doing [in Africa] and to apply it to local circumstances in Asia," says Berry. "There is a lot of interest in ColaLife from India, but we don't have the capacity to develop things there. So our strategy is to make all the information available. All the learning we generate goes up on the website."

Knowledge-sharing is part of an open innovation process that has helped the Berrys refine their embryonic idea and attract new expertise. Rohit Ramchandani was a senior health advisor at the Canadian

PICTURE CREDIT: COURTESY OF SIMON BERRY

International Development Agency when he first contacted Berry through ColaLife's Facebook group. Now studying public health at Johns Hopkins Bloomberg School of Public Health, Ramchandani is helping construct ColaLife's trial in Zambia and will use its results as the basis of his doctoral thesis.

"We've reached something of a crossroads in public health," says Ramchandani. "Much of the world's mortality can be prevented with existing solutions. Research has shown that over 60% of child deaths could be prevented each year if the world's children received full access to already existing, often low-cost interventions, such as ORS and zinc. So the problem is not so much about what's needed. It's more about how to effectively deliver what is needed to those who need it most."

Leveraging the private sector to distribute public health products isn't new. In Bangladesh, the private sector played a key role in the Scaling Up Zinc for Young Children (SUZY) Project, initiated in 2003 by the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) in partnership with the Bangladesh Ministry of Health and Family Welfare. A Bangladesh conglomerate called ACME Laboratories Ltd made the zinc tablets in its pharmaceuticals division and distributed them through its food and beverage division.

LIFESAVER The AidPod was designed to contain "social products," such as zinc supplements, oral rehydration solution, and water purification tablets. It is a crush-resistant, wedge-shaped canister that fits snugly between the necks of the Coca-Cola bottles.

"For the big health problems now and in the future, we cannot rely only on what the public health sector can deliver in nations that have fragile health systems," says Tracey Pérez Koehlmoos, head of the Health & Family Planning Systems Programme at ICDDR,B and principal investigator of the SUZY Project. "It's not enough. So any engagement [with the private sector] would be beneficial, so long as it's done with government approval and partnership."

With ColaLife, the Coca-Cola Company—which has a raft of philanthropic projects—is engaged, if not quite effusive. "We have been in contact with ColaLife and have supported them to identify a suitable bottling partner, SAB Miller, willing to conduct a pilot project with them," says Sebastian van der Vegt, group communications manager, in a statement. "We understand that the pilot will take place in Zambia and will focus on distributing [anti-]diarrhea kits to hard-to-reach areas. We look forward to learning from the results of the pilot project once it's completed."

ColaLife supporters who hail from health or humanitarian fields might not be natural supporters of a corporate behemoth that makes fizzy drinks. "In the age of chronic disease, big food and big beverage sort of come off as being the bad guys," says Koehlmoos. "Do you want your life-saving solution being packaged with what might make these children suffer as adults from obesity or diabetes?"

Berry is unfazed. "All we're doing is using that unused space in a crate to get this vital product to the same places that Coca-Cola gets to," he says. For Berry, building unlikely alliances between businesses and public health is the whole point. "Together, we believe, we can do it. There is no point sitting in our silos, throwing bricks at one another, when there is so much at stake."

And so much left to do. One of the UN's eight Millennium Development Goals is to reduce the under-5 mortality rate by two-thirds between 1990 and 2015. "Child deaths are falling, but not quickly enough to reach the target," reports the UN. "Revitalizing efforts against pneumonia and diarrhea, while bolstering nutrition, could save millions of children."

Berry sees ColaLife as part of that revitalization. "It will be decades before we get child mortality rates in developing countries that we would think acceptable in the United Kingdom," he says. "It could be more than 175 years. We need to carry on with incremental improvements, but we also need innovation."

Is there the possibility that ColaLife might not work? "Yup," admits Berry happily, exuding his trademark optimism. "But we're going to get caught trying." Ramchandani, the public health expert, puts it more cautiously. "The reality is that there is a lot of great [health] interventions that don't demonstrate statistically strong results, and are therefore never shared. That's why it is so important to incorporate evaluation into the research design early on, and share lessons learned along the way—something that ColaLife is doing extremely well."

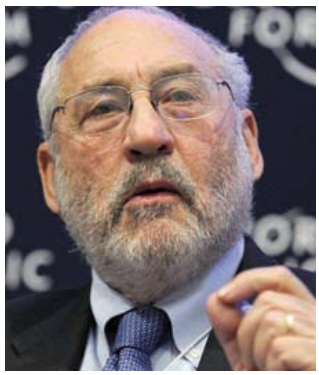
"Where will happiness strike next?" asks a Coca-Cola slogan. The question now is: Where will ColaLife strike next? ■

"We must connect the dots between climate change, water scarcity, energy shortages, global health, food security and women's empowerment. Solutions to one problem must be solutions for all."

—United Nations Secretary-General Ban Ki-moon, addressing the United Nations General Assembly in September 2011

"I would like to reiterate that we face daunting challenges. Asia's growth has brought significant benefits to the region. But it is an unfinished agenda, with the majority of the world's poor still in Asia. The region is at a critical crossroads. We must continue to be proactive."

—Asian Development Bank President Haruhiko Kuroda, speaking at the Eminent Persons' Forum in New Delhi, India in October 2011



"The top 1 percent have the best houses, the best educations, the best doctors, and the best lifestyles, but there is one thing that money doesn't seem to have bought: an understanding that their fate is bound up with how the other 99 percent live. Throughout history, this is something that the top 1 percent eventually do learn. Too late."

—Economist and Nobel laureate Joseph E. Stiglitz, writing for *Vanity Fair* in May 2011

"Social issues are far more complex to deal with than business problems, and it's very hard to change things. It needs tenacity and humility. And while individually it may be hard to see what difference we can make, if we stick to the task with tenacity for a sustained action, it will surely work."

—Azim Premji, chairman of Wipro, who donated $2 billion to his education foundation, the largest charitable contribution in India's modern history

"In 10 years, you're not going to have 700 million cars driven every day on the planet; you're going to have 2 billion. If you already have an emissions problem with 700 million cars, what problems are you going to have with 2 billion?"

—Nissan Chief Executive Officer Carlos Ghosn in an interview with *Fast Company* in 2011, where he talks about why the market is ready for an all-electric car

"Global warming is real. Perhaps our results will help cool this portion of the climate debate."

—Richard Muller, a prominent physicist and skeptic of global warming, writes in the *Wall Street Journal* in October 2011 after his study confirmed the rapid rise in the Earth's surface temperatures

PICTURE CREDIT: UN PHOTO/MARCO CASTRO (BAN KI-MOON); AFP

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