THE JOURNAL OF THE SCHOOL OF FORESTRY & ENVIRONMENTAL STUDIES SPRING 2008

environment YALE

FOREST DESTRUCTION'S PRIME SUSPECT

By Steve Kemper

National Parks Enshrine Policy to Commercialize Research

By Jon Luoma

page 16

Leaders from diverse fields assembled

in Anderson Park in Aspen, Colo., during a conference, "Toward a New Consciousness: Creating a Society in Harmony With Nature," convened by the Yale School of Forestry & Environmental Studies last October. The conference focused on examining the values and worldviews underlying our relationship with the natural world and encouraging affluent society to embrace an ethic of sustainability.

See story on page 12.

photo by Richard Shock

Correction In the honor roll of donors special insert (*environment:Yale*, Fall 2007), Paul Burns is listed as a member of the Sand County Society for the Class of 1942. He should have been listed under the Class of 1946.

environment:YALE

The Journal of the School of Forestry & Environmental Studies
Spring 2008 • Vol. 7, No. 1

Editor
David DeFusco
Director of Communications

Copy Editor
Anne Sommer

Alumni/ae Liaison to Editor
Kathleen Schomaker
Director of Alumni/ae Affairs

Design
Nancy J. Dobos
DobosDesign

environment:Yale is published twice a year (Spring and Fall) by the Yale School of Forestry & Environmental Studies. Editorial offices are located at 205 Prospect Street, New Haven, CT 06511.
203-436-4842
email: david.defusco@yale.edu
http://environment.yale.edu

printed on recycled paper with soy-based inks

CONTENTS

Photos on cover and page 4 by Bob Handelman (bob@bobhandelman.com)

dean's message

Dean James Gustave Speth

Time for Civic Unreasonableness

Hard to believe, but as early as 1981, in the waning days of the Carter administration, the President's Council on Environmental Quality issued a report calling for decisive national and international action to address the threat of climate change. (See the accompanying article, published in *The New York Times* on January 13, 1981.)

I was chair of Carter's Council on Environmental Quality at the time, and this report was our third, and final, major report on the climate-change challenge. For those who cared to look, there was enough information on climate change three decades ago to stir the deepest concerns. We even knew enough to recommend, as the *Times* story reports, that rising carbon dioxide concentrations be capped at 50 percent above the preindustrial level, a goal that makes environmental sense today. Because the United States and others failed to act on early warnings like ours, the prospects of halting the buildup of greenhouse gases at safe levels are now fast slipping away.

I could claim bragging rights of the I-told-you-so variety, but what a Pyrrhic victory! I raise this issue instead because it is important to understand how a long string of climate warnings and recommendations spanning several decades could have been largely ignored.

A number of factors probably combined to produce this unfortunate result. The climate issue is technically complex and not easy to master. I once heard the head of the Environmental Protection Agency totally confuse the climate issue and the ozone-depletion issue. Climate change has thus far unfolded gradually, and it has yet to produce the kind of crisis that generates action. Its most serious consequences stretch into the distant future, presenting the type of long-term problem with which our political system has great difficulty. And the search for solutions inevitably leads to the energy sector, where our political storehouse is full of worthy but neglected proposals for much-needed change. The combination of energy industry opposition and consumer concern plus higher energy prices has proven fatal.

Journalist Ross Gelbspan and others have pointed to the shortcomings of the media and other instruments of public education, which did not keep the climate issue on the front burner. In the 1970s and early 1980s, environmental issues were fresh; we environmentalists were constantly sought out by reporters. But the novelty faded and so did editors' interest. The beat did not always get the top reporters. Fortunately, this situation is changing today, at least on the climate issue. Indeed, one can appreciate how influential the media actually are as we see one cover story, TV special and film after another on the climate issue. It is easy to see what has been missing.

In his book *Boiling Point*, published in 2004, Gelbspan notes two other important and related patterns: One is that the desire of American journalists to seek balance by presenting two sides to even one-sided issues can actually introduce bias. The other pattern Gelbspan sees stems from the acquisition of most news outlets by a small group of conglomerates. With this change, Gelbspan believes that "the direction of the business has been determined by the profit-driven demands of Wall Street."

More significant than the shortcomings of the media, I believe, has been the rise of the modern right in recent American politics. Today's environmentalism had roots in the activism of the 1960s and early 1970s. It sought major regulatory intervention in the economy. It sometimes even talked about limits to growth. And just as it was getting started, so were the Olin Foundation and other funders of the New Right, to whom these ideas were anathema. As the environmental organizations were gaining traction, the American Enterprise Institute, the Heritage Foundation, the Cato Institute, the Pacific Legal Foundation and other right-leaning groups were too. Market fundamentalism gained strength in parallel with today's environmentalism.

Frederick Buell, in his valuable and undernoticed book, *From Apocalypse to Way of Life: Environmental Crisis*

in the American Century, has chronicled what happened: "Something happened to strip the environmental cause of what seemed in the 1970s to be its self-evident inevitability. … The most important explanation for these events isn't hard to find. In reaction to the decade of crisis, a strong and enormously successful anti-environmental disinformation industry sprang up. It was so successful that it helped midwife a new phase in the history of the U.S. environmental politics, one in which an abundance of environmental concern was nearly blocked by an equal abundance of anti-environmental contestation. … The public drive for environmental change had been 'neutralized' by the 1980s, blocked by an increasingly organized and elaborate corporate and conservative opposition." Our public discussion of the climate issue has certainly been one area of such contestation, amply fueled by oil and other industry support.

Finally, I would argue that the failure to rise to the climate-change challenge is part of a larger failure to treat as priorities a number of major environmental threats and that we are all complicit in that failure. It is worth remembering what it has taken to build the current momentum for climate action: after a quarter-century of neglect, societies now risk ruining the planet. And while the threat of disastrous climate disruption does seem to be motivational at last, many other environmental risks continue to be largely ignored. Our values are too materialistic, too anthropocentric and too contempocentric, with the result that we have hardly begun what Thomas Berry has said must be our Great Work—"moving the human project from its devastating exploitation to a benign presence."

George Bernard Shaw famously remarked that all progress depends on being unreasonable. It's time for a large amount of civic unreasonableness. It is time for the environmental community—indeed, all of us—to step back from the day-to-day and develop a deeper critique of what is going on. ■

U.S. Study Warns of Extensive Problems From Carbon Dioxide Pollution

By Philip Shabecoff
Originally published on Jan. 13, 1981, in *The New York Times*

WASHINGTON—The President's Council on Environmental Quality warned today that national and international energy policies must immediately start addressing the problem of carbon dioxide pollution if major long-range climatic and economic problems were to be avoided.

In a report, the council said that carbon dioxide released into the atmosphere by the large-scale burning of oil, coal and other fossil fuels could lead to "widespread and pervasive changes in global climatic, economic, social and agricultural patterns." The report said the problems could begin early in the next century.

Gus Speth, chairman of the council, conceded that there was still some scientific uncertainty about the timing and effects of the carbon dioxide buildup in the atmosphere. But Mr. Speth said that, given the magnitude of the risks and the fact that industrial countries were now formulating long-range energy plans, the carbon dioxide buildup must be considered in energy policy decisions. He said it would be too late to change course once the impact of the buildup began to be felt.

Carbon dioxide is a colorless, odorless gas produced, for example, by the burning of fossil fuels and other carbon-based matter. It has no known direct effect on human health and until recently was not regarded as an environmental problem.

Melting of Polar Ice Feared

However, there has been a growing scientific consensus that the buildup of carbon dioxide in the atmosphere is creating a "greenhouse effect" by trapping some of the earth's heat and warming the atmosphere.

The council report said that a doubling of carbon dioxide in the atmosphere from pre-industrial levels would raise the average global temperature by about 3 degrees centigrade and by 7 to 10 degrees centigrade at the poles. The report said that if the warming pattern persisted long enough it could melt polar ice and raise ocean levels by over 20 feet in several decades.

"This rise would force a gradual evacuation of cities, towns and countryside located along coastlines," the report said. Even a 15-foot rise in ocean levels would flood coastal areas of the United States occupied by 11 million people, the report said.

Shifts in temperature and rainfall could lead to "major and disruptive changes in global agricultural patterns," the report said. These changes, in turn, could lead to broad new refugee and hunger problems, it added.

The level of carbon dioxide is currently estimated at 15 to 25 percent above pre-industrial levels existing around the year 1800. One recommendation of the report is that agreement be reached by industrialized nations on a safe maximum level for carbon dioxide in the air. It suggested a level 50 percent higher that that of pre-industrial times as an upper limit.

FOREST DESTRUCTION'S

PRIME SUSPECT

By Steve Kemper

Ten years ago, Suifenhe and Manzhouli were small, little-known towns on China's remote northern border with Russia. They are now booming centers of chaotic and often illegal commerce. The growth was fueled by timber. The vast forests of the Russian Far East—the world's second-largest carbon sink after Amazonia—are draining through border towns such as Suifenhe and Manzhouli at an alarming rate, often with help from the Russian mafia, Chinese criminal gangs and corrupt officials on both sides of the border. The raw logs get sawn into boards before being transported farther along the timber chain in China, where thousands of factories churn

out wood products that end up in homes in the United States, Europe and Japan.

Suifenhe and Manzhouli are still unknown to most Westerners, but they are no longer inconsequential. Nor are they uncommon. Huge quantities of wood, much of it illegally cut, reach China every day from timber depots in Indonesia, Malaysia, the Mekong Delta, central Africa and Amazonia. These places are feeding China's voracious appetite for wood, which in turn is continuously stoked by global demand for inexpensive furniture, flooring and other wood products. This cut-and-consume cycle is destroying the world's forests with breathtaking speed and on a scale never before seen.

"China is becoming a black hole for tropical timber around the world," says William Laurance, a senior research scientist at the Smithsonian Tropical Research Institute in Panama. "Basically, half of all timber being traded in the world is going to China. *Half*. That's an incredible figure. China has completely altered the tropical timber trade."

It has happened fast. A decade ago, China was a blip in the global wood industry. It imported few logs and exported relatively few wooden products. Domestic forests supplied the country's modest needs. A perfect storm of developments changed all that. In 1998, the Yangtze River flooded catastrophically, killing several thousand people and leaving millions homeless. The main cause was erosion brought about by deforestation—common throughout China. The government responded by banning logging in the country's few remaining natural forests.

At the same time, the Chinese economy had begun to surge, which intensified demand for wood needed for construction, paper and other products. This spurred the country's wood-manufacturing sector, whose expansion required a constant supply of two things: logs and new markets. For both, China looked abroad.

A few statistics capture China's recent impact on the world's forests and timber industry, as well as the Western consumerism that has subsidized it:

- Between 1997 and 2007, the volume of wood imported by China tripled. The country is now the world's biggest importer of raw forest products (logs and sawn timber). Nor is China's appetite for wood likely to diminish anytime soon. A 2006 report by Forest Trends, a Washington, D.C., group that monitors the timber trade, predicts that China's forest imports will double within a decade.
- By 2005, China had become the world's largest exporter of wood products, valued at more than $17 billion. China's biggest customer: the United States, which bought about $7.9 billion worth in 2005.
- China now makes about a third of the world's furniture. Between 2000 and 2006, its exports of furniture rose from 91 million pieces to 248 million pieces. The largest portion—about 40 percent—went to the United States.
- China has become the world's second-largest producer of paper and paperboard and the biggest producer of plywood and veneers made from tropical hardwoods.
- Between 1997 and 2005, imports of wood products from China to the United States and the European Union rose by more than 700 percent.

Asian and Pacific countries, including the Russian Far East, supply about 70 percent of the wood entering China. In the last decade, the forests in many of these places have been plundered on an immense scale. The Smithsonian's Laurance found that half of all Asian nations have lost more than 70 percent of their forests, with Indonesia and Malaysia especially hard-hit. According to a 2006 report by Forest Trends, "If current cutting rates continue, the economically accessible mature natural forests in Papua New Guinea will be gone in 16 years or less. The equivalent figure for Indonesia is 10 years. The situation in Myanmar is no better, and may be even worse, and the Philippines and Thailand have already logged out most of their natural forests." If the logging in Russia's eastern forests continues at the present rate, they could disappear in 20 years.

"If current cutting rates continue, the economically accessible mature natural forests in Papua New Guinea will be gone in 16 years or less."

William Laurance

Much of this wood ends up in China, and much of it is cut illegally—90 percent in Papua New Guinea, according to Forest Trends; 95 percent in Myanmar, according

STR/AFP/Getty Images

to Global Witness, which monitors the links between corruption, environmental abuses and human rights; up to 70 percent in Russia and Malaysia. Indonesia's minister of the environment estimates that 73 percent of the wood leaving his country is illegal and says that 37 of the country's 41 national parks are being pillaged by loggers.

As the Asian forests have thinned out, China and its Asian suppliers have turned their attention to new sources in central Africa and South America, with similar results. Chatham House, a British think tank that monitors the timber industry, estimates that 70 percent of the Chinese logging in sub-Saharan Africa is illegal.

According to a 2006 World Bank report, "It is feared that the Chinese demand, which does not currently distinguish between legally and illegally produced timber for imports, is escalating the problem of illegal logging." A 2008 report for the World Wildlife Fund (WWF) by Constance McDermott, program director of the Yale Program on Forest Policy and Governance and Program on Forest Certification at F&ES, and Lloyd Irland, Ph.D. '73, lecturer and senior research scientist at F&ES, concurs: "It is likely that a significant portion of the wood products imported into China comes from logging practices that destroy and/or degrade high-conservation-value forests, and/or are otherwise unsustainable or illegal."

A shop in Jianli, China, sells freshly cut logs, mainly used for construction of homes in Jianli, in central China's Hubei Province. China's surging demand for wood, spurred by its rapid economic growth, threatens to have a devastating impact on forests around the world, the WWF warned, as China has become a major importer of timber and pulp from countries like Russia, Malaysia and Indonesia, and is now one of the major destinations for wood that is being illegally harvested or traded.

About 70 percent of that imported wood leaves China as inexpensive wood products. Many of these products end up in the living rooms of U.S. consumers, who are unaware that they are bankrolling a criminal enterprise with far-reaching consequences.

The costs of China's timber trade are immense. The first casualties are the local people, who often get swindled by loggers. A December 2007 report by the Environmental Investigation Agency (EIA) recounts that on the Indonesian island of Salawati, a logging company paid villagers $22,000 for hardwood worth $3 million. In Africa, Greenpeace found contracts in which communities signed away logging rights worth hundreds of thousands of dollars for less than $100 worth of salt, sugar and beer.

If the local people object, police or military often step in to intimidate or coerce villagers. In Burma, military officials have obliged their Chinese partners by expelling villagers from forests. In the Democratic Republic of Congo, soldiers have used violence against people protesting the actions of loggers. Last year, a Penan chief in Borneo who opposed logging was killed.

In many poor countries, the property rights of local communities are tenuous or unrecognized, a flaw exploited by logging companies and governments. "In Cambodia, Laos and also China," says Kerstin Canby, director of the Forest Trade and Finance Program at Forest Trends, "there's something harsh going on called economic land concessions. The land is technically the government's, but people are living on it, so when the government sells or gives away this land for a plantation or an agribusiness, it causes human rights issues."

According to the World Bank, more than a billion poor people depend on forests for subsistence. When those forests disappear, local people lose their principal resource and their livelihood. Mark Ashton '85, Ph.D. '90, Morris K. Jesup Professor of Silviculture and Forest Ecology, has traveled and worked in many of the areas affected by rampant logging and has seen the social consequences. "The original communities are completely destabilized," he says. "Their standard of living quickly lowers from subsistence to poverty."

> "It is likely that a significant portion of the wood products imported into China comes from logging practices that destroy and/or degrade high-conservation-value forests."
> *Lloyd Irland*

Nor do the national governments see much economic benefit. Most of the profits are pocketed by a few logging companies and corrupt officials. The rest of the money leaves the country with the logs. The companies often pay bribes, but not taxes, royalties or customs fees. A World Bank study estimated that illegal logging on public lands alone costs poor governments $15 billion a year. Indonesia estimates that outlaw loggers cheat it of $4 billion a year, money that could go toward schools, health care and infrastructure. An EIA investigation exposed one Indonesian

smuggling racket that transported rare merbau logs worth $1 billion a year from Papua New Guinea to China.

By avoiding expenses, outlaw companies also warp the price of wood. According to a 2004 report by the American Forest &

"Illegal logging is financed and conducted by criminal syndicates and mafias with high-level connections."

2007 EIA Report

Paper Association, illegal logging costs the U.S. timber industry $1 billion a year in lost exports and cut-rate prices.

"If you take wood and you don't pay the landowner," says Ashton, who is also director of F&ES school forests, "and you don't pay the nation, if it's public land, and then you export that wood and sell it, you're lowering the price, because there is always a cost in sustainability. And if you're trying to take wood in a sustainable way, you also have to do it in such a way that you do least harm to the land. That also costs money. So illegal logging affects sustainable forestry in a huge way. We're having a hard time sustainably managing the Yale Forests because of depressed timber values due to illegal logging in Siberia, Asia and Latin America, and the raw logs go directly to these big industries in China."

The loggers leave a trail of destruction beyond the cutting. They kill animals for food, pollute water and denude riverbanks, which leads to erosion, flooding and landslides. They leave behind slash that contributes to forest fires. They destroy habitat and sometimes push threatened and endangered animals to the brink, including Siberian tigers, Amur leopards, red pandas, Sumatran tigers and elephants, bonobos and orangutans. Loggers often build access roads, which encourages incursion by small farmers or industrial loggers and agribusiness.

And, of course, the massive loss of trees worsens climate change. According to the Stern Review, deforestation is responsible for nearly 20 percent of global carbon emissions—making it worse for the planet than emissions from transportation or industrial manufacturing.

One of the most toxic consequences of illegal logging is corruption, which rots respect for law and destroys not only lives but hope. The scale of what is occurring would be impossible without the help of crooked officials from beginning to end. "In several country case studies," notes the 2007 report from EIA, "illegal logging is financed and conducted by criminal syndicates and mafias with high-level connections. Bribery and impunity undermine the rule of law in developing countries and cripple the enforcement functions of government agencies."

The network of corruption is wide. When EIA traced the merbau logs involved in that $1 billion-a-year smuggling ring, the trail led from the forests of Papua New Guinea to ports where the Indonesian military allowed the logs to be shipped to middlemen in Jakarta, Singapore and Hong Kong. Next the logs passed through Chinese customs—despite Indonesia's ban on all exports of merbau and China's bilateral agreement not to import it. The logs ended their trip at Chinese factories that make flooring for export to the United States and elsewhere. After the report was released in 2005, the Indonesian government cracked down and arrested some of the smugglers. The illegal traffic slowed. But corrupt judges acquitted all but a few underlings, including every major suspect, and by 2007 the smugglers were back in business, using false papers and new routes to China through Sarawak and Sabah in Malaysia.

Matthew Steil, research associate for the World Resources Institute's forest initiative in central Africa, worries about the Chinese companies flooding into Africa and exploiting its resources. But he worries just as much about other pernicious long-term effects. For instance, the Chinese are changing the development model in Africa. Loans from Western governments and institutions, such as the World Bank, come with environmental and accounting requirements, but the Chinese impose no such conditions.

"Over the last 10 or 15 years, these governments had been moving toward better governance, more transparency, more sustainability," says Steil, "but with the influx of all this money with no strings attached, China has basically subverted the whole process. Everybody was getting more involved—the local populations, the multilaterals, the increasing integration of all the stakeholders. Those processes have been shoved to the side in favor of direct negotiations between the minister of mines and the Chinese investment bank. It becomes this bilateral affair between highly corrupt money-hungry politicians on the African side and investors on the Chinese side who are looking to acquire as many resources as they can. The Chinese companies are also pushing back against the need to adhere to any environmental or social standards. So things are actually going backwards now."

Kerstin Canby, who worked on African logging issues for the World Bank before joining Forest Trends, also sees Africa as an important testing ground. "The World Bank is probably scared to death that all its lending will be undermined by Chinese financing," she says. "For the World Bank to survive in Africa, they have to get China to come in line with their donors' way of thinking about corporate social responsibility and environmental impact assessments. If the World Bank can convince China, then there's hope. China is proud that they provide support without conditions."

Some of the countries being plundered, including Indonesia, Cambodia, Laos and Vietnam, have passed bans against the export of certain timber. But laws are toothless unless enforced, and the forests in all these places continue to fall, mostly toward China.

The industrial countries also have taken steps. The G8 countries developed an "action program" on illegal logging, which encourages countries to develop better governance. About 100 countries have signed onto the Forest Law Enforcement and Governance (FLEG) ministerial process, which calls for various actions to fight illegal logging, including bilateral agreements about procurement policies and sourcing of wood.

In 2006, President Vladimir Putin, exasperated by what he called the embezzlement of Russia's Far Eastern forests, created a plan to prevent illegal logging. Thus far its only effect has been to confuse the forestry authorities, says F&ES' McDermott, who visited the Russian-Chinese border last October. "It's not clear what the new law even is," she says, "or who's in charge or where revenue goes."

Workers transport logs at a forestry farm in Yichun City of Heilongjiang Province, northeast China. Located in the Lesser Xing'an Mountains hinterland, Yichun is one of the most important wood production bases in China.

China Photos/Getty Images

Getty Images

An artisan sands a table in a small crafts factory complex in China.

The situation along the Russian-Chinese border also demonstrates the difficulties inherent in another possible solution to illegal logging—certified wood. This "green" label is supposed to guarantee that a log has been validated as legal all along the timber chain, from the forest to its final incarnation as furniture, flooring or paper. McDermott says that's an impossible goal in the timber depots along the Russian-Chinese border.

"By the time the logs get to the border," she says, "a lot of different operations have mixed their logs together. It's not a clean chain. And once the logs hit China, it's complete chaos. A train comes in and 100 brokers are lined up, pointing at different cars and buying them on the spot through cell phones. It's that fluid. There's certainly no long-term relationship between suppliers and companies. So how can you possibly say where that log came from once it hits the border or what happens to it when these hundreds of wholesalers and distributors buy it? The chain of custody is already shattered before it leaves the border."

Fraudulent documents are also laughably easy to obtain. Logs from Indonesia, Malaysia or Africa are often laundered through various districts and entrepôts, where corrupt officials stamp them. By the time the logs reach China, they have become legal imports. "The longer the chain gets," says McDermott, "the harder it is to be sure that the documentation is accurate."

The new report for WWF that McDermott co-authored points out that a piece of furniture is likely to contain multiple species of wood purchased from multiple vendors, who in turn bought the wood from multiple middlemen. So a single piece of furniture, notes the report, "could contain wood products involving literally dozens of separate companies at different processing and distribution levels. The inclusion of wood from a number of different countries, including China, is likely. As a result of this complexity, the actual tracing of a log from a forest concession in a tropical country, to a specific furniture item on the loading dock of a Chinese plant, would be a daunting undertaking indeed."

Several organizations have developed standards for verifying whether wood is green. The most common method of tracking wood is via audits by independent inspectors. The Tropical Forest Trust is experimenting with bar codes on logs, and Australia is looking into a DNA test that matches the genetic code of wood legally harvested in Indonesia with the wood that actually reaches Australian ports.

The most widely used certification standard comes from the Forest Stewardship Council (FSC), based in Bonn, Germany. FSC puts its logo of approval on about $5 billion of wood products each year. What this label means is unclear. Last October *The Wall Street Journal* reported that FSC was certifying wood from companies known to be destroying tropical forests, and noted that FSC based its recommendations on reports done by outside auditors who were paid by the companies they were rating. FSC has since vowed to tighten its criteria for approval.

"Tracking is just so central to all of this," says McDermott. "If there's no really credible way to track this wood as it moves around the world, you're lost before you start." In any event, certified wood barely registers in the timber trade, accounting for an estimated 7 percent of volume.

Market pressures may eventually improve this. The European Union and Japan, for instance, have adopted procurement policies that require companies bidding on civic contracts to prove that the wood they use is legally and sustainably harvested. In January, New York City banned the use of Amazonian hardwoods for park benches. In February, the office products company Staples ended its relationship with Asia Pulp & Paper Co. (APP), one of the world's largest paper companies, with big pulp mills in Indonesia and operations in China. According to *The Wall Street Journal*, Staples' vice president for environmental issues didn't cite green concerns for the decision, but the "great peril to our brand" of being associated with APP.

Pressuring large retailers may make a dent. Wal-Mart, Home Depot, Lowes and Ikea have become sensitive about the issue of illegal logging and have pledged to improve the sourcing of their wood, though with little follow-up or effect. In December, for instance, EIA released an investigation of manufacturers that supply wood products to Wal-Mart. "The suppliers pretty much unanimously said that Wal-Mart does a lot of inspecting in terms of quality control, but nothing in terms of the sources of wood," says David Groves of EIA. "When we went undercover at one manufacturer and asked about the source of the wood, because we needed to know for our customers, she laughed as if we were kidding. Whenever we asked whether big customers like Wal-Mart asked about origins, they said no, never."

Home Depot's website declares, "We now know item by item—from lumber to broom handles, doors to molding and paneling to plywood—where our wood products are harvested." "That just doesn't sound feasible at all," says F&ES' McDermott.

On the supply side, China's response to illegal logging has been contradictory. Last August, for instance, its State Forestry Administration and Ministry of Commerce issued guidelines for all Chinese companies doing logging overseas. The guidelines endorse sustainable forestry and preservation of biodiversity.

More typically, however, Chinese authorities deny that any illegal wood is entering the country, deny any responsibility for criminal acts performed in other countries or put the blame on Western consumers. They show little interest in certification mechanisms. They prefer to focus on their domestic achievements in forestry, which are considerable. The government is in the midst of planting 2.5 billion trees, the biggest reforestation project ever undertaken. In December, in an article in the journal *Science* titled "China's Forestry Reforms," several Chinese scientists boasted that in the past six years the country has invested $22 billion in the forestry sector, with plans to invest another $68 billion in the next four, and that the wood products industry is booming.

"The actual tracing of a log from a forest concession in a tropical country, to a specific furniture item on the loading dock of a Chinese plant, would be a daunting undertaking."

WWF Report

"The article is true insofar as what it mentions," says Smithsonian's Laurance, "but there was not one word about the wood industry's ties to illegal logging."

continued on page 31

Growing Concerns About the Environment Raise Hope of a New Public Consciousness

Editor's Note: What follows is an edited excerpt from the forthcoming report, "Toward a New Consciousness: Creating a Society in Harmony With Nature," which is based on a conference convened by the Yale School of Forestry & Environmental Studies in Aspen, Colo., in October 2007. The report will be published by the F&ES Publication Series and available at www.yale.edu/environment/publications. In addition, a book of essays edited by conference co-chair Stephen Kellert is forthcoming.

The conference began with the recognition that our world, our only habitat, is a biotic system under such stress that it threatens to fail in fundamental and irreversible ways. Global climate change, biodiversity extinctions, deforestation, water shortages and many other compounding stresses have created a truly global environmental crisis. Major changes are now required to stabilize and restore the functional integrity of natural systems around the world. Meanwhile, although these environmental facts have been extensively detailed by the scientific community and debated by some within policy and government, they have not yet captured the full attention of the public or sufficiently altered society's behavior toward the natural world. A modest number of people know a great deal about these unfolding tragedies—the nature of the threat, what is driving it, what can be done to change course before the impacts become irreversible—but their messages have difficulty overcoming public apathy, political denial or entrenched opposition. We need to understand this collective failure. In particular, we must critically examine the values and worldviews underlying our current relationship with the natural world and identify means by which we can promote a shift in these deepest wellsprings of human behavior.

To pursue these issues, the Yale School of Forestry & Environmental Studies convened over 60 leaders in the natural and social sciences, philosophy, communications, education, religion, public policy, business, the creative arts and the humanities. The participants were divided by background and expertise into six broad domains: Business; Communication; the Humanities; Policy; Science; and Social Transformation (philanthropy and non-governmental organizations). They were asked to identify values prevalent within their own domain that contribute to the global environmental crisis, followed by a diagnosis of ecologically dysfunctional values and worldviews prevalent in society. The groups then suggested ways to overcome these obstacles.

"For a long, long time the environmental community has been running on the original fuel from the 1970s. We felt then that if we put in place a well-thought-out,

photos by Richard Shock

1) David Grant, president and CEO, Geraldine R. Dodge Foundation; Dahvi Wilson '07, conference rapporteur; Michel Gelobter, president, Redefining Progress.

2) Michel Gelobter; Dean Gus Speth, conference co-chair; Jonathan Rose, president, Jonathan Rose Companies, and member of F&ES Leadership Council.

3) Pavan Sukhdev, managing director and head of the Global Markets Division, Deutsche Bank; Christy Brown, co-founder and past president, Center for Interfaith Relations; Jonathan Rose; Howell Ferguson, chair and CEO, Lykes Bros., and member of F&ES Leadership Council.

4) Anthony Leiserowitz, director, Yale Project on Climate Change; Theodore Roosevelt IV, managing director and chair of the Council on Climate Change, Lehman Brothers.

5) Stephen Kellert, Tweedy Ordway Professor of Social Ecology and conference co-chair.

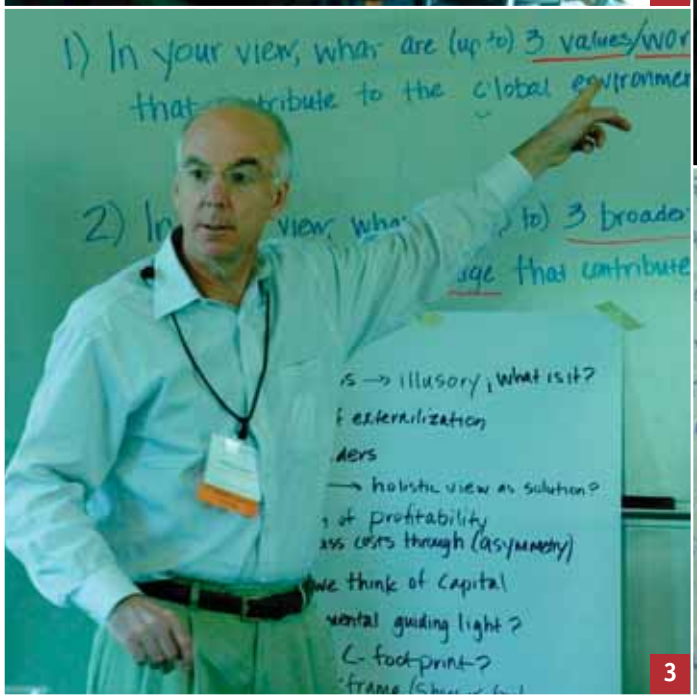
6) Juliet Schor, professor of sociology, Boston College; Julia Marton-Lefèvre, director general, International Union for Conservation of Nature; Pavan Sukhdev; Michael Lerner, co-founder and president, Commonweal.

well-planned, economically sound proposal for the private sector, accompanied by a little lobbying and litigating, we could get the end result we sought. Nothing major was required in terms of people's values or lifestyles," said Dean Gus Speth. "What we have come to realize is that if we are going to deal with environmental challenges on the scale needed, we need a profound change of values leading to major behavioral change."

Kathleen Dean Moore, Distinguished Professor of Philosophy at Oregon State University, said, "People who have a superficial relationship with their environment are hungry for something, but they don't know what they hunger for. There's a national loneliness—a grief over losses


1


2



3

4

photos by Richard Shock

in personal time and a lack of connection to others and to sources of renewal."

At the same time, public opinion polls around the world show that many people are growing increasingly worried about the state of the environment, according to Anthony Leiserowitz, a conference organizer, survey researcher and director of the Yale Project on Climate Change. "People want their leaders to act, and say they are willing to change their own behavior, at least to a small degree."

In another hopeful sign, the world's major religions are taking significant steps to confront the environmental crisis. Mary Evelyn Tucker, a conference organizer and religious scholar, said, "Religious spirituality, ritual and scripture are sources of immense cultural power with the potential to effect large-scale changes in environmental values, attitudes and behavior." Many conference participants expressed hope that the world is heading toward a cultural tipping point or, in Dean Speth's words, "the rise of a new consciousness."

"Living in harmony with nature is not a sacrifice or an act of selfless altruism. It is a forceful affirmation of an ancient aspiration for fulfillment and even happiness," said Stephen Kellert, Ph.D. '71, conference co-chair and Tweedy Ordway Professor of Social Ecology.

A variety of initiatives to help catalyze a shift toward a more ecologically sustainable relationship with the natural world were proposed at the conference, including the need to:

Develop new narratives that illustrate the self-destructive trends in the current relationship between human beings and the natural world, and envision alternative, sustainable pathways of human development. These new narratives need to:

• Raise fundamental questions: How should individuals and societies measure success—higher incomes, growing GDP, greater material consumption? How much is enough? What constitutes "quality of life"? What truly makes individuals happy?

1) Humanities working group, clockwise: Dianne Dumanoski, back to the camera, environmental journalist; John Grim, co-director, Yale Forum on Religion and Ecology; J. Baird Callicott, professor of philosophy and religion, University of North Texas; Mary Evelyn Tucker, chair of the humanities working group and co-director, Yale Forum on Religion and Ecology; Rachel Holmes '08, joint M.E.M. and M.Div. candidate; Eugenie Gentry, F&ES director of development; Andrew Mackie '08; Christy Brown, co-founder and past president, Center for Interfaith Relations; Kathleen Dean Moore, professor of philosophy, Oregon State University.

2) Paul Raskin, president, Tellus Institute, and chair of the policy working group; Peter Brown, professor of geography and natural resource sciences, McGill University.

3) William Staudt, managing partner, Environmental Capital Partners, and chair of the business working group.

4) Juliet Schor, professor of sociology, Boston College; Carl Safina, co-founder and president, Blue Ocean Institute.

The economy and markets are human constructs, human tools—but to what ends? What means are appropriate, ethical and acceptable to achieve our individual and social aims?

• Depict the links between the global environmental crisis, consumption patterns and lifestyle choices, such as quality of life, hours worked, leisure and family time, food choices, relationships, health, security and faith.

• Re-envision "the good life" while embracing diversity, recognizing pluralism and allowing multiple visions. There is no single master narrative that fits all people, all places and all circumstances.

• Seek to alter the trajectory of ever-greater material consumption. Social psychologists have demonstrated that people who voluntarily simplify their lives are happier than others in affluent society. These individuals have shifted their focus from the acquisition of more and more things to the goals of self-acceptance, strong relationships with friends and family and community engagement or, as Clive Hamilton, a conference participant, put it: from "lives of riches to rich lives." This story puts a different spin on traditional environmental arguments, because it does not depend on expert and scientific descriptions of the state of the world to motivate change. Instead, it works at the deeper psychological level of human desire, aspiration and motivation.

• Embed the human story in a deeper understanding of the human relationship to nature—the Universe Story. A deep understanding of modern cosmology places human beings within the grand narrative of the universe, from the Big Bang to the formation of galaxies, the coalescing of Earth and the solar system, and the origins and evolution of life. This narrative reminds us that human beings are not separate from nature—we emerged from it. We are the descendants of a vast, complex, terrifying and beautiful universe, inhabitants of an incredibly precious planetary home and genetically kin, literally, to all other life on Earth.

Conduct Scientific Research on the Role of Values in Behavior

We currently lack fundamental knowledge about the role of human values and attitudes in sustainable and unsustainable behavior. To address this critical knowledge gap, many have called for a Millennium Assessment of Human Behavior—an international research effort to identify, measure and explain global trends in sustainability values, attitudes and behaviors. We need to understand, through rigorous empirical studies, the role core values play in human behavior. Which values matter most? How do values and worldviews differ around the world, and how do they influence different cultural trajectories of development and consumption? What barriers stand between professed values and actual behavior?

Similarly, we need empirical research on human well-being. What factors drive not only human health, but happiness and fulfillment? What implications do these factors have for the way our societies and economies are currently structured? What are their ecological implications? How can they be used to promote ecological sustainability? How are human and ecological well-being linked and mutually supportive?

Prepare for the Opportunities Inherent in Future Crises

We need to be prepared to act when crises occur. Thomas Homer-Dixon has written about opportunity in crisis in his book, *The Upside of Down*. Crises like Three Mile Island and 9/11 resulted in rapid and fundamental shifts in public priorities and institutions. As global environmental conditions continue to deteriorate, there will be inevitable surprises, shocks and disasters. How can leaders be prepared not only to better respond to the damage and destruction of these events, but also to take advantage of these teachable moments? The policy community needs to prepare for future crises by creating institutions, systems and roadmaps for change, so that negative responses, such as authoritarianism, do not seize the day.

Reconnect People and Nature

A movement to bring agriculture and a land ethic back to the city is quietly building in the form of Community Supported Agriculture programs, farmers' markets, efforts to source school lunches locally and convert abandoned properties and brownfields into community gardens, etc. A concerted effort is needed to amplify these innovations and explore other ways of reconnecting people to nature, especially within urban settings. ■

Stewards of Public Resources *or* Private Profits?

NATIONAL PARKS ENSHRINE POLICY TO COMMERCIALIZE RESEARCH

Scientists have commercialized discoveries of life forms taken from thermal features such as Black Sand Basin, located in Yellowstone National Park.

By Jon Luoma

The "mountain men" of the American West were fur trappers, adventurers and, often enough, known spinners of extravagant Bunyanesque yarns. So no one really knew whether to believe their stories of a fantastical land around the intersection of the boundaries of present-day Wyoming, Montana and Idaho—a vast "hell" of steaming hot streams, kettles, lakes and roaring "steamboat springs" that spewed water and vapor into the air.

There might have been more than traces of exaggeration in some of the stories (like the one about cooking up whole haunches of elk in boiling lakes), but by the Civil War era, new, more-reliable explorers were confirming the region's geologically fantastical setting. Col. Walter Washington deLacy, leading a group of gold prospectors through the region in 1863, wrote of a multitude of geysers and "intensely hot" springs—"boiling up in the middle," he wrote, "many of them of very large size."

The stories came from the place the world would later know as Yellowstone, destined to be America's first national park. Today the 2.2-million-acre park, crown jewel of the national park system, remains a mostly intact wild ecosystem, a land of mountain and meadow, famously home to grizzly bears and bison, bighorn sheep and, thanks to a successful 1990s reintroduction, even healthy packs of long-absent grey wolves. And yes, it is the site of some of Earth's most wondrous geologic thermal features, some 10,000 of them, astoundingly more than half of all the thermal features on the planet.

None of deLacy's 1860s prospectors managed to get rich taking precious metals out of Yellowstone. And, of course, mining, logging and every other form of conventional resource exploitation is banned in the park. Yet at about the time this issue appears in print, the National Park Service is expected to issue a long-awaited final Environmental Impact Statement (EIS) aimed at defining the terms by which a newer, higher-tech version of prospector will be allowed to extract—some would say "exploit" or even "pirate"—certain riches from Yellowstone and, by extension, any of the national parks.

At issue is bioprospecting, which has provoked a host of questions about how

Getty Images/VisionsofAmerica/Joe Sohm

private interests might use for commercial gain life forms extracted from parks that are held in public trust.

At the center of this controversy lie Yellowstone's thermal features. Five years after deLacy's party reached the area, another group of gold prospectors reconfirmed the wonders and reported what seemed commonsensical, that in these steaming waters "life could not long be sustained." For fully a century, science concurred that waters so hot must naturally be sterile. But in 1966, Indiana University scientist Thomas Brock and his assistant, an undergraduate named Hudson Freeze, found—against all reason—life indeed. In the 170º F waters of Mushroom Spring, they found a thriving population of pink bacteria uniquely adapted to an aquatic environment far hotter than anyone had thought survivable.

"It was an amazing discovery of the limits of life," says Tom Olliff, chief of the Yellowstone Center for Resources.

Perhaps more amazing is the scientific and technological revolution that Brock and Freeze's discovery eventually unleashed. They named their newly discovered life form *Thermus aquaticus*, now often called simply *Taq*. Fully 20 years after their discovery, Kary Mullis, a scientist at the U.S.-based Cetus Corp., would isolate from *Taq* an extremely heat-tolerant enzyme that made it possible for his company to commercialize a process he had invented for DNA replication, but which had been stalled because it subjects genetic material to otherwise intolerably high temperatures. Called polymerase chain reaction, the process would win Mullis the Nobel Prize, and his "PCR machine" would become the core technology leading to an explosion of

"Privatizing life in a place like Yellowstone is like privatizing the sky. … We didn't save Yellowstone to make a profit. We saved it because it has greater value."

Jonathan King

DNA replication and analysis in fields ranging from biotechnology, to genetics, to criminology. When you hear of scientists cracking the human genome, or definitively identifying a new species, or exonerating an innocent defendant based on DNA, polymerase chain reaction and that key enzyme isolated from Yellowstone's tiny *T. aquaticus* are at the heart of it all.

Brock and his young student Freeze were simply conducting basic field research. Surely they hadn't set out to be bioprospectors or to make any corporation rich. But their discovery turned out to be a commercial mother lode. Cetus paid the American Type Culture Collection in Washington, D.C., where the original samples of *Taq* were stored, a mere $35 for its original microbial sample. The company would later sell its patents to the Swiss pharmaceutical giant Hoffmann-La Roche for $300 million. By the 2000s, annual sales of *Taq* alone would reach $100 million.

Yet neither Yellowstone National Park, nor the park system in general, nor the people of the United States received even a dime as a result of the discovery. According to Olliff, the entire affair would come to be known both inside the National Park Service and out as "the great *Taq* rip-off."

So perhaps it's easy to understand why, in 1996, during the Clinton administration, the National Park Service's director decreed that the same sort of rip-off should never happen again, that in the future, the parks and the American people would at least receive reasonable compensation for discoveries made using park resources.

There was plenty of reason to believe that more remarkable discoveries with commercial value could be in the offing. The *T. aquaticus* discovery in Yellowstone and the subsequent exploitation of *Taq* have led to a soaring interest in an array of other microbes, which also thrive in seemingly impossible environments, all generally classified as "extremophiles." There is, for instance, "Conan the Bacterium," an organism that can tolerate 10,000 times more radiation than a human. A few extremophiles have already been commercialized. In extremely alkaline lakes in Africa, Palo Alto (Calif.)-based Genencor found one that's become an important additive in the popular laundry detergent, Tide, and another that is used in IndiAge, a commercial product to artificially fade denim blue jeans—hardly the stuff of Nobel Prizes but among the developments that have helped make Genencor the world's second-largest biotechnology company.

In 1997, Yellowstone National Park signed the Park Service's first agreement under a new, so-called benefits-sharing policy with the San Diego-based Diversa Corp. The company had already been collecting samples of life forms in the park under standard research permits. But the new agreement was designed to prevent more bioprospecting rip-offs. It provided $100,000 in cash compensation to the park and another $75,000 per year in DNA analysis equipment and related training for park staff over five years. The agreement also stipulated that, this time around, if the company ever commercialized one or more products developed from its research in the park, the National Park Service would receive royalties of up to 10 percent.

Yet the agreement never went into effect. Shortly after both parties signed the agreement, a consortium of policy groups focused on biotechnology and on the environment, including the Edmonds Institute, the International Center for Technology Assessment and the Alliance for the Wild Rockies, sued the National Park Service, insisting that the agreement was a "backroom deal" that would "allow the commercial exploitation of Yellowstone." The suit claimed that the agreement violated existing rules prohibiting commercial use of national park resources. In a letter to supporters, the Edmonds Institute's director, Beth Burrows, quoted MIT molecular biologist Jonathan King, who said, "Privatizing life in a place like Yellowstone is like privatizing the sky. … We didn't save Yellowstone to make a profit. We saved it because it has greater value."

Tom Gihring

***Thermus aquaticus* biofilm streamers in the Twin Butte Vista Spring at Yellowstone National Park.**

In April 2000, a federal district court judge in Washington, D.C., dismissed the suit itself, agreeing with National Park Service arguments that any profits to Diversa would come from its own discoveries related to the life forms, not from the commercialization of the life forms themselves. But the court also left intact a ruling it had made a year earlier—that the entire idea of benefits-sharing arrangements was such a dramatic change in policy that the park would have to prepare a detailed federal EIS.

Yellowstone staff, who took the lead on this Park Service-wide EIS, took until late 2006 to complete a draft version. Over the next few months, 10,000 public comments poured in, many of them letters objecting to the "preferred" option identified in the EIS: continuing bioprospecting but with benefits sharing agreements in place. The version to be published this spring will be a "final EIS." Park officials readily acknowledged (as this issue was going to press) that the final version will concur that benefits sharing, largely as envisioned in the pioneering Diversa agreement more than a decade ago, will be enshrined as the park's bioprospecting policy for the future.

Burrows said late last winter that she wasn't willing to predict what her group, which has led opposition to the benefits-sharing arrangements, will do if the final EIS is issued without substantial restrictions, but she did acknowledge that further legal action could be an option. And she insists that a host of questions remain unresolved.

"These are living organisms in a park that belongs to the public," she says. "Are they there to be disposed of and developed? Can we be sure that if this happens, it's going to be done in a manner that protects the parks for the future? In the future, are national park employees going to be stewards of profits for corporations, rather than stewards of resources that belong to all the people of the United States?"

> "We consider it to be scientific research, just like the other kinds of scientific research we allow by permit in the parks."
>
> *Tom Olliff*

Yellowstone's Olliff dismisses such concerns. "We just don't consider it to be a commercial use of the park," he says. "We consider it to be scientific research, just like the other kinds of scientific research we allow by permit in the parks, where you take your samples to your lab and learn something from them."

If any result becomes a commercial product, he says, "It's not the park's resources that will end up belonging to anyone. People who take samples will be able to own only what they've learned. They'll be able to patent their intellectual property, but the resources themselves will still belong to the parks."

Beyond that, he says, the 2000 federal court ruling stands. "With or without benefits sharing, the courts have made it clear that bioprospecting in the parks is legal."

Indeed, bioprospecting on protected public lands has continued, at least in Yellowstone, in the absence of a policy for benefits sharing. Already, one researcher has garnered a patent for a microbe found in Yellowstone that can oxidize sulfide, a pollutant in groundwater. Others are working with microbes that may be able to convert cellulose in agricultural wastes into ethanol.

And Olliff insists that the parks have much more to gain than they stand to lose—benefits that certainly could include additional funds for research in cash-strapped parks, but also expertise than can be loaned or shared. Yellowstone, for instance, has no microbiologists on its scientific staff. But in recent years, it has been able to work informally with scientists at Diversa to obtain a DNA analysis of samples collected from the bottom of Yellowstone Lake, discovering nine new microbial life forms in the process.

Michael Colby, in the online version of the newsletter Counterpunch, warned darkly of a future where commercial "extraction machines" mine the parks' living resources, but Olliff insists that nothing of the kind will be allowed. He notes that sampling heat-tolerant microbes, say, in a steamy pool has often amounted to filling a liter-sized bottle with hot water, which he calls "a smaller impact on resources than the average backpacker has."

None of which has proven very reassuring to opponents, who point to the original Diversa agreement negotiated "secretly," or at least absent any open public involvement. Indeed, the preferred options as outlined in the new EIS include provisions to prevent release of any corporate information contained in benefits-sharing agreements deemed to be proprietary. That could include the kinds of important new scientific discoveries a noncommercial scientist ordinarily would publish and share with the world.

But what seems to gall many critics most is the idea that protected resources in a place like Yellowstone, world-class in their uniqueness, could through any kind of mechanism become a version of private property, intellectual or otherwise—a sense, as journalist Geov Parrish put it when the draft version of the EIS was released late in 2006, that "absolutely everything is now for sale in our mercenary culture." ■

United States Slips in Latest Environmental Performance Index

By Alan Bisbort

The state of the world's environment, like its economy and climate, is in constant flux. And Dan Esty, director of the Yale Center for Environmental Law and Policy, has spent the better part of the last decade trying to get a statistical bead on it.

With the release of the 2008 Environmental Performance Index (EPI), Esty and his colleagues and student research assistants took a giant step forward in that effort. For one thing, the number of participating countries has, since the release of the 2006 index, increased to 149 from 133. For another, the number of statistical indicators of performance has risen to 25 from 16, tightening the focus of the EPI and, thus, increasing its usefulness to policy makers. Finally, the EPI's reputation preceded it to Davos, Switzerland, where Esty released the 2008 rankings at the World Economic Forum in January.

"There is more interest than ever in the EPI," said Esty, who met with delegates from participating countries and with top U.N. officials.

Two years ago, the big news at Davos was the relatively poor ranking of the United States in the EPI. This year, its rank has slipped even further, to 39th from 28th place. Among the countries that now surpass the United States in environmental performance are Albania, Croatia, Malaysia and Slovenia.

"You can't really compare the 2008 EPI with the 2006 EPI," said Esty, who collaborated with a team from Columbia University's Center for International Earth Science Information Network in assembling the data. "The added weight given to climate change and the increase in the number of countries involved resulted in a greater shift in the numbers than would have been the case had all factors remained the same."

Nonetheless, the six policy categories examined by the index—environmental health; air pollution; water resources (replacing water quality); biodiversity and habitat; productive natural resources; and climate change (replacing sustainable energy)—were roughly the same, allowing for some continuity between the 2006 and 2008 indices.

> "We're starting to see what happens when countries treat environmental issues with disdain."
>
> *Dan Esty*

"We're starting to see what happens when countries treat environmental issues with disdain," said Esty. "If you don't pay attention, then other countries that do invest in carbon-efficient technology and economic growth will pass you by on the EPI. The United States is doing well on some environmental indicators, but it's lagging badly on ozone preservation, reduction of greenhouse gas emissions and managing its water resources sustainably."

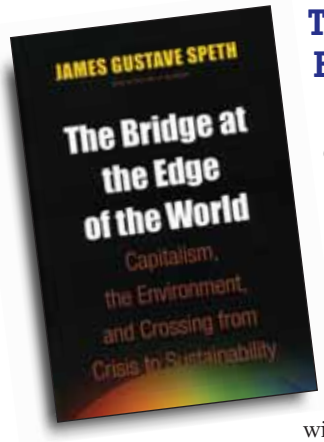
Dean Gus Speth was less circumspect about the performance of the United States, saying, "The United States' climate-change ranking alongside India and China near the bottom is a national disgrace."

Almost guaranteeing a warm reception for Esty and his colleagues in Davos was Switzerland's ranking at the top of the index.

"I was, of course, accused of playing to the home court," said Esty, laughing. "But the data show that Switzerland is the most carbon-efficient developed country in the world. They have low-carbon electric generation, using a great deal of hydropower and nuclear power, purchased from France. Their transportation system is efficient, with trains carrying much of their freight, rather than trucks."

Esty looks ahead to creating a separate EPI just for China. "We received a grant to launch this project in China, on a province-by-province basis," said Esty. "I tell my students that China offers good news and bad news. The good news is that if we can turn China around environmentally, nothing else matters. The bad news is that if we can't, nothing else matters. Their buildup of industrialization will overwhelm all of the rest of the good that is being done elsewhere on the planet." ■

To view the EPI's rankings and for information about the methodology and data used in producing the EPI, visit http://epi.yale.edu.

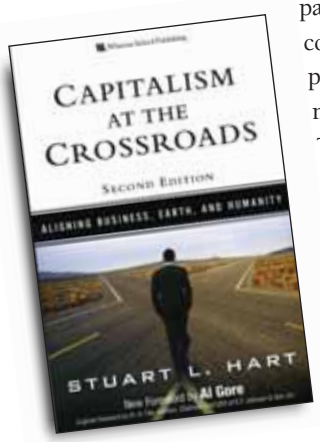


The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability

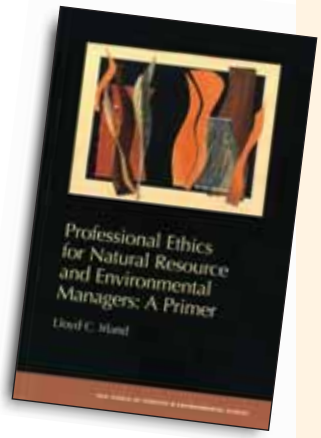
In *The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability*, F&ES Dean Gus Speth argues that American-style consumer capitalism is incompatible with a healthy environment and fails to advance the happiness and social well-being of Americans. He calls upon citizens to mobilize spiritual and political resources for change. His proposals include forcing corporations to become legally accountable to society, not just to shareholders; seeking happiness in social solidarity and nature as opposed to consumerism and materialism; transforming democracy by limiting corporate influence and restoring power and control to citizens at the local level; and forging a new environmental politics that links environmentalism with social liberalism, human and civil rights and the fight against poverty. He observes that while the environmental community has grown in strength and sophistication, the health of the environment has continued to decline. As a result, he contends that government action is needed to fundamentally transform the economy so that it benefits, not harms, the environment. The book is published by Yale University Press. To purchase a copy, visit www.yalebooks.com.

Capitalism at the Crossroads: Aligning Business, Earth, and Humanity

In *Capitalism at the Crossroads: Aligning Business, Earth, and Humanity*, Stuart Hart '76 addresses the challenges confronting global capitalism. Hart suggests that economic growth must occur through the creation of sustainable, society-serving products and new technologies that reduce poverty and protect the environment. In his model, the environmental costs of business are passed on to industries and consumers, making best practices for sustainability more attractive and viable. This second edition, which includes a new foreword by former Vice President Al Gore, is published by Wharton School Publishing. To purchase a copy, visit www.whartonsp.com or www.amazon.com.



Professional Ethics for Natural Resource and Environmental Managers: A Primer

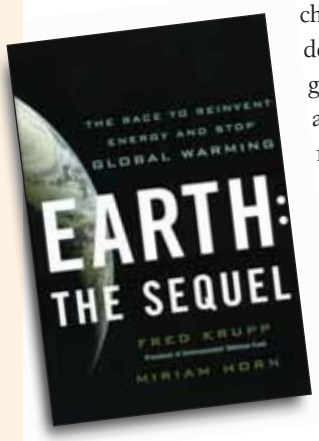


In *Professional Ethics for Natural Resource and Environmental Managers: A Primer*, Lloyd Irland, Ph.D. '73, F&ES lecturer and senior scientist, offers practitioners and students a guide to ethical thinking and its implications for natural resource and environmental management. Topics include the rights of employees; detecting and resolving conflicts of interest; confidentiality and proprietary information; defining professional standards; plagiarism and credit; safety standards; conflicts of canon and commitments; and ethical involvement in public debate. Irland dedicates a part of the book to the practical application of ethical codes, standards and questions critical to the professional life of a resource manager. The book is published by F&ES. To purchase a copy, visit www.yale.edu/environment/publications.

book shelf

Earth: The Sequel—The Race to Reinvent Energy and Stop Global Warming

In *Earth: The Sequel—The Race to Reinvent Energy and Stop Global Warming*, co-authors Fred Krupp, president of Environmental Defense Fund and a member of the F&ES Leadership Council, and Miriam Horn contend that society can make a business of solving global warming by encouraging entrepreneurs to build new industries, jobs and fortunes of the 21st century. The authors feature charismatic inventors who are racing to develop clean-energy technologies and generating a newfound optimism about protecting the world's environmental and economic future, among them a utility engineer who feeds smokestack gases from coal-fired plants to voracious algae and then turns them into fuel, and a frontier impresario who keeps his ice hotel frozen all summer with the energy of hot springs. According to the authors, these individuals have remarkably creative and practical ideas, but their innovations won't come to market fast enough to beat global warming unless the federal government enacts a mandatory cap on carbon dioxide emissions. The book is published by W.W. Norton & Company. To purchase a copy, visit www.wwnorton.com or www.amazon.com.



Sampling Strategies for Natural Resources and the Environment

In *Sampling Strategies for Natural Resources and the Environment*, Timothy Gregoire '82, Ph.D. '85, J.P. Weyerhaeuser Jr. Professor of Forest Management at F&ES, and Harry Valentine of the USDA Forest Service in Durham, N.H., have brought their expertise to bear on a thorough treatment of probability sampling strategies for both discrete populations and continuums of natural and environmental resources, with an emphasis on designs applicable to the fields of ecology, forestry, natural resources and environmental science. This book is for students and researchers who need to know how to sample natural populations and continuums in a credible manner. The authors present methods for estimating aggregate characteristics on a per-unit area basis, as well as on an elemental basis. The book promotes an understanding of the fundamentals that support sampling theory, estimation and inference. This is, in short, a guide to designing and implementing reliable samples. The book is published by Chapman & Hall/CRC. To purchase a copy, visit www.taylorandfrancis.com or www.crcpress.com.

The San Marcos: A River's Story

In *The San Marcos: A River's Story*, James Kimmel '71 combines the perspectives of a natural scientist and an historian to take the reader on a voyage of discovery on the San Marcos River, whose headwaters may be the site of some of North America's earliest human settlements. The book features the photography of Jerry Touchstone Kimmel and is published by Texas A&M University Press. To purchase a copy, visit www.tamu.edu/upress or www.amazon.com.

Money Can't Buy You Love, Or Happiness

(Editor's Note: This article is adapted from Dean Gus Speth's book, *The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability*, published this spring by Yale University Press. For more details, see Bookshelf, page 21.)

The Edisto River glides gracefully through the South Carolina low-country, its dark, tannin-stained waters spread out over both banks into beautiful hardwood bottomlands.

I grew up in a small town on the Edisto in the 1940s and '50s. Our house was about a mile from a swimming area the town had established down from a high bluff along the river. We swam there every summer. The area from the top of the bluff down to the water had been terraced, and the girls put blankets on the grass and worked on their (one-piece) tans. At the bottom, along the riverbank, benches ran between the large cypress trees, where the mothers sat watching their children play in the shallow water near the edge. A pavilion at the top of the bluff served RCs and hot dogs. We racked up points on the pinball machines there and listened to the juke box play "Sixty Minute Man," a song to fuel a boy's fantasy if there ever was one.

Childhood memories like this tumble out of deep storage as I get older. Thoughts of swimming in the Edisto have occurred to me particularly as I have thought about our environmental future. For many years I could not buck the river's current, but as I grew older and stronger, I was able to make good headway against it. In my environmental work for close to four decades, I've always assumed America's environmental community would do the same—get stronger and prevail against the current pushing in the opposite direction. But in the last few years I have been forced to think hard about whether this assumption is correct. I have concluded it is not. The environmental community has grown in strength and sophistication, but the environment has continued to deteriorate. The current is too swift, and we must find things to do other than always swimming against it.

The need for a new approach to the environment would not be so urgent if environmental conditions were not so urgent. America is a comfortable place for many of us, myself included. But our comforts deceive us. The mounting threats point to an emerging environmental tragedy of unprecedented proportions.

How serious is the threat to the environment? Here is one measure of the problem: all we have to do to destroy the planet's climate and biota and leave a ruined world to our children and grandchildren is to keep doing exactly what we are doing today, with no growth in the human population or the world economy. Just continue to release greenhouse gases at current rates, just continue to impoverish ecosystems and release toxic chemicals at current rates, and the world in the latter part of this century won't be fit to live in. But, of course, human activities are not holding at current levels—they are accelerating dramatically. It took all of history to build the $7 trillion world economy of 1950; today economic activity grows by that amount every decade. At current rates of growth, the world economy will double in size in less than two decades. We are thus facing the possibility of an enormous

One can only conclude that **growth** is the **enemy** of environment. Economy and environment remain in **collision.**

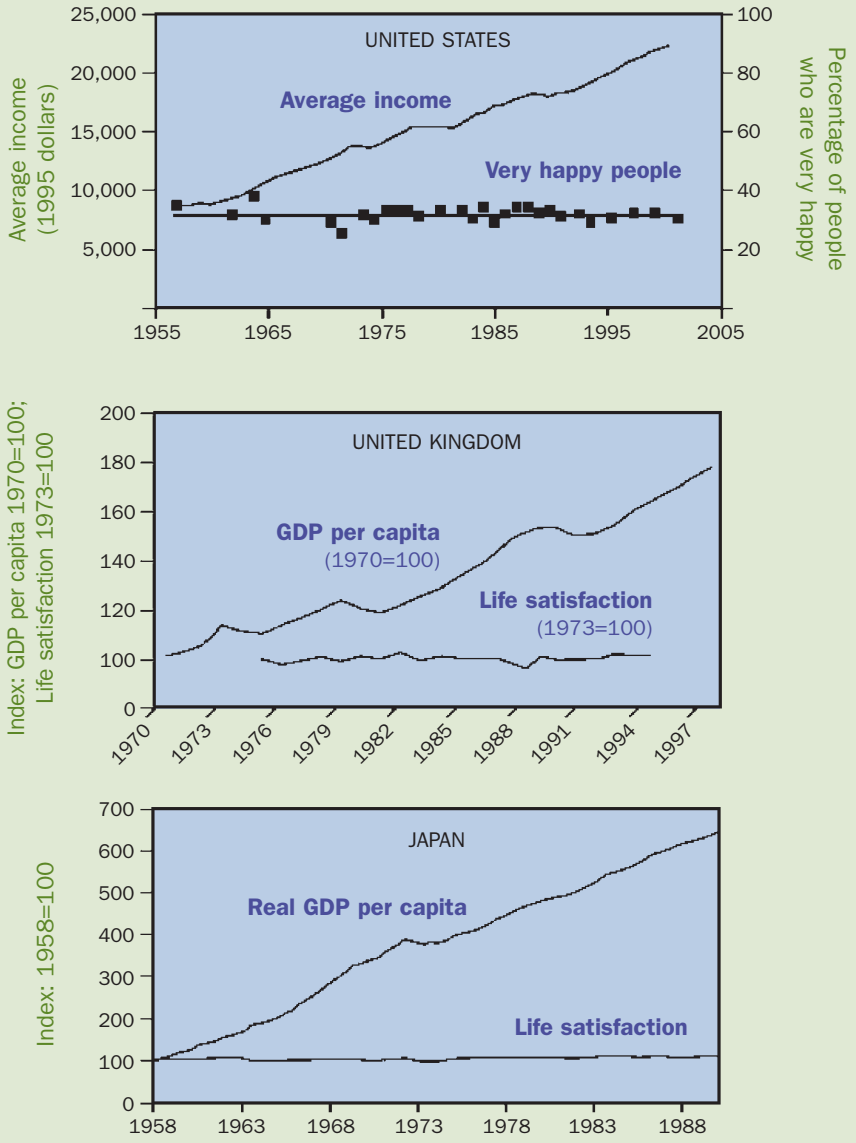
increase in environmental deterioration, just when we need to move strongly in the opposite direction.

We live in a world where economic growth is generally seen as both beneficent and necessary—the more, the better; where past growth has brought us to a perilous state environmentally; where we are poised for unprecedented increments in growth; where this growth is proceeding with wildly wrong market signals, including prices that neither incorporate environmental costs nor reflect the needs of future generations; where a failed politics has not meaningfully corrected the market's obliviousness to environmental needs; where economies are routinely deploying technology that was created in an environmentally unaware era; and where there is no hidden hand or inherent mechanism adequate to correct the destructive tendencies. So, right now, one can only conclude that growth is the enemy of environment. Economy and environment remain in collision.

But is growth in highly affluent societies like ours actually improving our lives? Psychologists have recently turned to measuring life satisfaction, human happiness and, generally, subjective well-being. There is now even a *Journal of Happiness Studies*. These psychologists have developed measurable concepts of human happiness that are more robust and satisfying than either Benthamite pleasure-seeking or pursuing Stoic civic virtue. For example, they have found very high correlations between self-reported measures of happiness and life satisfaction and an index of psychological well-being that takes into account purpose in life, autonomy, positive relationships, personal growth and self-acceptance. Thus, when the social scientists measure happiness and life satisfaction, they are measuring important things, not superficial ones.

What do these studies tell us? First, there are the studies that compare levels of happiness and life satisfaction among nations, from very poor to very rich. They find that national levels of life satisfaction do increase with rising incomes, although the correlation drops substantially when factors such as quality of governments are statistically controlled.

However, this positive relationship between national well-being and national per capita income disappears when one looks only at countries with GDP per capita over $10,000 per year. In short, once a country achieves a moderate level of income, further growth does not significantly improve perceived well-being.



Trends in life satisfaction and happiness versus per capita income in affluent societies (Sources: United States chart, *Capitalism As If the World Matters*, 2005; United Kingdom, *Life Satisfaction*, 2002; Japan, *Happiness and Economics*, 2002).

Even more challenging to the idea that well-being increases with higher incomes is the extensive time series data showing that throughout the entire postwar period, as incomes skyrocketed in the United States and other advanced economies, reported life satisfaction and happiness levels stagnated or even declined slightly.

But that is not all. Psychologists Ed Diener and Martin Seligman note that "even more disparity [between income and well-being] shows up when ill-being measures are considered. For instance, depression rates have increased 10-fold over the same 50-year period, and rates of anxiety are also rising. … There is [also] a decreasing level of social connectedness in society, as evidenced by declining levels of trust in other people and in governmental institutions. Because trust is an important predictor of societal stability and quality of life, the decreases are of considerable concern."

There is, however, a seemingly paradoxical finding—namely, surveys show that within countries, at any one time, richer individuals tend to be happier than poorer ones. In *Happiness: Lessons From a New Science*, Richard Layard reports that in the United States, 45 percent of those in the top quarter of incomes say they are "very happy," whereas only 33 percent of those in the bottom quarter are very happy. In Britain, the numbers are 40 percent versus 29 percent.

How can one explain this? There is, first, good evidence that happier people are more successful and do better financially. The causation thus seems to run in both directions. Second, wealthy individuals have a smaller gap between their incomes and their desires. But how do we account for the fact that richer people within societies are happier, while societies that get richer don't get happier? Two factors are at play—social positioning and habituation. People constantly compare themselves with others and, if everyone is better off financially, then no one is any happier. If comparative position is what counts, not absolute income, then rising incomes can leave just as many unhappy comparisons. You may be able to buy a new Dodge, but your neighbor just bought a Lexus. You're moving up to a larger house, but so is everyone else. This human tendency to compare ourselves with others has not escaped the attention of humorists. Ambrose Bierce's *The Devil's Dictionary* defined happiness as "an agreeable sensation arising from contemplating the misery of another." Numerous studies confirm that happiness levels depend inversely on one's neighbor's prosperity.

A second factor is what is called habituation, or the hedonic treadmill. People adapt or habituate to their new incomes. Richard Layard explains this in *Happiness:* "When I get a new home or a new car, I am excited at first. But then I get used to it, and my mood tends to revert to where it was before. Now I feel I *need* the bigger house and the better car. If I went back to the old house and car, I would be much less happy than I was before I had experienced something better. … Once your situation becomes stable again, you will revert to your 'set-point' level of happiness.

"The things that we get used to most easily and most take for granted are our material possessions—our car, our house. Advertisers understand this and invite us to 'feed our addiction' with more and more spending. However, other experiences do not pale in the same way—the time we spend with our family and friends and the quality and security of our job."

So how do we sum up matters thus far? "Those who say money can't buy happiness just don't know where to shop!" the joke goes, but the truth is that the data indicate that money can't buy happiness or satisfaction in life among the more affluent. Study after study shows that there is a sharply declining marginal utility to extra income. As Diener and Seligman put it: "Economic growth seems to have topped out in its capacity to produce more well-being in developed nations. … Efforts and policies to raise income in wealthy nations are unlikely to increase well-being and might even undermine factors (such as rewarding social relationships or other cherished values) that have higher leverage for producing enhanced well-being. … Income, a good surrogate historically when basic needs were unmet, is now a weak surrogate for well-being in wealthy nations."

If incomes are such weak generators of well-being in our more affluent societies, what are the things that really do produce happiness and unhappiness? Most importantly, it appears that our genes do. Some of us are just congenitally happy or unhappy. Our genes seem to account for about half the variation in individual happiness.

Regarding things that can be changed, unemployment—getting laid off—is devastating to one's sense of well-being. For many, even finding a new job does not restore well-being to former levels. Self-reported good health also correlates with well-being, and mental disorders are an increasingly widespread source of human misery. Diener and Seligman also stress the importance of personal relationships: "The quality of people's social relationships is crucial to their well-being. People need

Once a country achieves a moderate level of **income**, further growth does not significantly improve perceived **well-being**.

supportive, positive relationships and social belonging to sustain well-being. … The need to belong, to have close and long-term social relationships, is a fundamental human need. … People need social bonds in committed relationships, not simply interactions with strangers, to experience well-being."

Layard has summed up the factors neatly: "What doesn't matter: We can begin with five features that on average have a negligible effect on happiness. The first is age. If we trace people though their life, average happiness is remarkably stable, despite the ups and then downs of income and despite increasing ill-health. The second is gender. In nearly every country, men and women are roughly equally happy. Looks too make little difference. Likewise, IQ is only weakly correlated with happiness, as are physical and mental energy (self-rated). Finally, education has only a small direct effect on happiness. … So what really does affect us? Seven factors stand out: our family relationships, our financial situation, our work, our community and friends, our health, our personal freedom and our personal values. Except for health and income, they are all concerned with the quality of our relationships." An earlier 2002 study by Diener and Seligman found that the most important characteristic shared by the happiest students were their strong ties to friends and family.

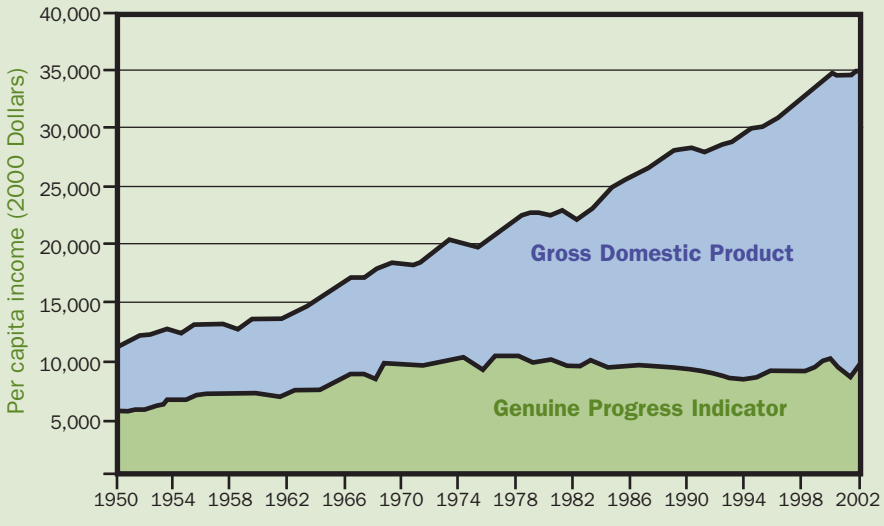
Other authorities have put a finer point on the problem of why we're not getting happier and are getting more depressed and anxious. Sociologist Robert Lane sees a pattern of lock-in and overshoot. In *The Loss of Happiness in Market Democracies*, he notes that "we get happiness primarily from people; it is their affection or dislike, their good or bad opinion of us, their acceptance or rejection that most influence our moods. … My hypothesis is that there is a kind of famine of warm interpersonal relations, of easy-to-reach neighbors, of encircling, inclusive memberships and of solidary family life.

"Something has gone wrong. The economism that made Americans both rich and happy at one point in history is misleading them, is offering more money, which does not make them happy, instead of more companionship, which probably would."

Another perceptive national observer, author Bill McKibben, has reached a similar conclusion. In *Deep Economy*, he notes that "our single-minded focus on increasing wealth has succeeded in driving the planet's ecological systems to the brink of failure, even as it's failed to make us happier." How did it happen? he asks. "The answer is pretty obvious—we kept doing something past the point that it worked. Since happiness had increased with income in the past, we assumed it would inevitably do so in the future." Instead, McKibben notes, it has led us to become more thoroughly individualistic than we really want to be, increasing social isolation and undermining our sense of community.

If American society has lost its way following the compass provided by Gross Domestic Product (GDP), it is not surprising that many observers have sought to identify the shortcomings of that measure and to develop alternatives that more faithfully gauge human and environmental well-being. First, the system of national economic accounts that gives us GDP has been under attack by analysts who believe that GDP is badly flawed even as a system for measuring economic welfare. They point out a series of shortcomings in GDP as currently measured—shortcomings that are, in fact, widely conceded.

GDP includes everything that can be sold or has monetary value, even if it adds nothing to human well-being or welfare. Imagine a society that spends 20 percent of its GDP on prisons and police, on cleaning up pollution and on the consequences of traffic accidents. Now imagine another society that has no need for these defensive expenditures, for example, because its citizens don't pollute or drive recklessly and are law-abiding. This second society, instead, allocates that 20 percent of GDP to better schools, on improving life expectancy and



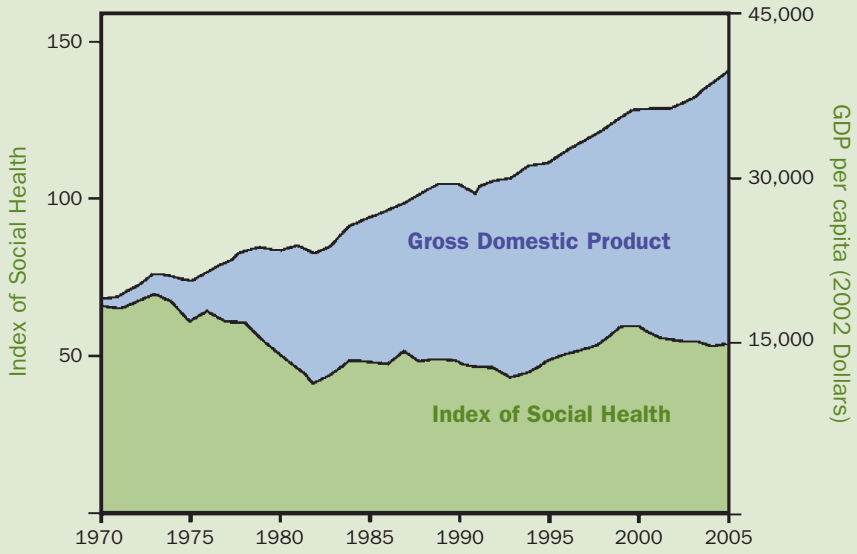
Trends in GPI per capita and GDP per capita in the United States (Source: *The Genuine Progress Indicator*, 2004).

on alleviating the problems of the poor. GDP is the same in both countries, but welfare is much higher in the latter case.

Second, GDP does not count the costs and benefits that occur outside the market. For example, a country can consume its natural capital, but that shows up in national income accounts not as capital depreciation but as income. Robert Repetto, professor in the practice of economics and sustainable development at F&ES, has written, "A country could exhaust its mineral resources, cut down its forests, erode its soils, pollute its aquifers and hunt its wildlife and fisheries to extinction, but measured income would not be affected as these assets disappeared. … [The] difference in the treatment of natural resources and other tangible assets confuses the depletion of valuable assets with the generation of income. … The result can be illusory gains in income and permanent losses in wealth." GDP also neglects to count the real welfare benefits generated by volunteer and household labor.

And third, GDP fails to take into account the distribution of the income measured, despite the fact that for most societies, welfare could be improved by shifting disposable incomes from the very rich to the very poor, where the marginal utility of income is almost certainly higher.

The shortcomings of GDP as a measure of social and environmental conditions have stimulated a proliferation of measures and indicators that seek to improve our understanding of actual conditions. The most interesting efforts to date have been those seeking to create comprehensive alternatives to GDP. One of the first of these is the Index of Sustainable Economic Welfare. It begins with national private consumption expenditures and then adjusts them for distributional inequalities. It then adds in nonmarket contributions to welfare, such as unpaid housework, and subtracts defensive expenditures such as police protection and pollution control, and it also subtracts the depreciation of natural resources and environmental assets.



Trends in the Index of Social Health and GDP per Capita in the United States, 1970-2005 (Source: *America's Social Health: Putting Social Issues Back on the Public Agenda*, 2007).

In the United States, the Index of Sustainable Economic Welfare has been improved under the new label of Genuine Progress Indicator (GPI). The GPI suggests that Americans on average are no better off today than they were in 1970, even though GDP per capita has grown greatly during that period.

It should be stressed that alternative measures like the GPI employ major methodological and data assumptions that are open to dispute and to improvement. Yet, they build on the pioneering work of the best economists, including James Tobin and William Nordhaus; they are serious efforts; and they do tell us something. In short, the GPI tells us that, since the early 1970s, growth's positive impact on the welfare of Americans has been far, far less than that suggested by GDP.

Another approach to index development is to stop trying to express conditions in dollars and cents, and instead construct composite indicators based on objective, measurable social and environmental conditions. Again, there is an arbitrary element, but we can still learn important things. My colleague Daniel Esty, Hillhouse Professor of Environmental Law and Policy, and his associates have developed an index that evaluates nations' environmental performance. Among 149 countries Esty ranked in 2008, the United States was down the list at 39th. America's great wealth is not being translated into stellar environmental performance.

Turning to social conditions, trend information in the United States was collected into a composite index by Marc and Marque-Luisa Miringoff for the 1970-2005 period. Their index combined 16 measures of social well-being, including data on infant mortality, high school dropouts, poverty, child abuse, teenage suicide, crime, average weekly wages, drug use, alcoholism, unemployment and so on. The Miringoffs' Index of Social Health shows somewhat deteriorating social conditions despite huge growth in GDP per capita.

Richard Estes at the University of Pennsylvania has developed a Weighted Index of Social Progress for 163 countries going back to 1970. It captures objective measures of both social and environmental conditions. Estes reports that the pace of social development in the United States has been "on hold" since 1980. The overall ranking puts the United States far down the list of the world's countries, tied with Poland and Slovenia for 27th place. America's affluence is thus not being translated into either outstanding environmental *or* social performance.

Taken together, these results suggest the need for a radical rethinking and reordering of priorities. Right now, the reigning policy orientation and mindset hold that the way to address social needs and achieve better, happier lives is to grow—to expand the economy. Productivity, wages, profits, the stock market, employment and consumption must all go up. Growth is good. So good that it is worth all the costs. What Paul Samuelson and William Nordhaus call our "ruthless economy" can undermine families, jobs, communities, the environment, a sense of place and continuity, even mental health, because in the end, it is said, we'll somehow be better off. And we measure growth by calculating GDP at the national level and sales and profits at the company level. And we get what we measure.

But what the data and the analysts reviewed here are saying is that it is just not so. Aggregate economic growth—mere GDP growth—is no longer making us better off, and the data suggest that in some ways it is making us worse off, environmentally, socially and psychologically. We are substituting GDP growth and more consumption for dealing with the real issues—for doing things that would truly make us better off.

Aggregate economic **growth**—mere GDP growth—is no longer making us **better** off, and the data suggest that in some ways it is making us **worse** off, environmentally, socially and psychologically.

Those who preach the gospel of growth undoubtedly believe what they preach. But for those in government, business and the media who call us to worship at the altar of GDP, this incessant demand for ever-more aggregate growth is largely self-serving, and therefore they rarely look beyond the quarterly economic reports to see what they are missing. The result is that society is being misled, literally.

There are huge lessons for public policy in the analyses reviewed here. It is time to chart a new course for the United States. To generate real solutions to our social needs and problems, we need instead to address these problems directly and thoughtfully, with compassion and with generosity. There's a whole world of new and stronger policies that are needed—measures that strengthen our families and our communities, address the breakdown of social connectedness and favor rootedness over mobility; measures that guarantee good, well-paying jobs and increase employee satisfaction, minimize layoffs and job insecurity and provide for adequate retirement incomes; measures that introduce more family-friendly policies at work, including flextime and easy access to quality child care; measures that provide us with more time for leisure, informal education, the arts, music, drama, sports, hobbies, volunteering, community work, outdoor recreation, exposure to nature and play; measures that provide for universal health care and alleviate the devastating effects of mental illness; measures that provide everyone with a good education, education for life as well as for productivity; measures that provide care and companionship for the chronically ill and incapacitated; measures that address prejudice, exclusion and ostracism; measures that recognize our duties to the half of humanity that lives in poverty, duties now reflected in the Millennium Development Goals; measures that regulate advertising, prohibit advertising to children and provide free airtime for people to talk back; and measures that sharply improve income distribution and tax luxury consumption and environmental damage and put the proceeds into our starved public sector and into strengthened income support and social programs for those at the bottom.

These are among the things America should be striving to increase. These are directions that need to be emphasized in public investments and elsewhere. Yet, if you raise these issues in the councils of our major environmental organizations, the answer could likely be, "These are not environmental issues." But they are. They are a big part of the alternative to the destructive path we are on and, as such, they should be seen as environmental measures as well as social ones. My hope is that all Americans who care about the environment will come to embrace these measures—these hallmarks of a caring community and a good society—as necessary to moving us beyond money to sustainability and community. Sustaining people, sustaining nature—they are just one cause, inseparable. ■

Study Offers New Paradigm on Ecosystem Ecology

Predators have considerably more influence than plants over how an ecosystem functions, according to a Yale study that was published in February in *Science*.

The findings, according to the author, Oswald Schmitz, Oastler Professor of Population and Community Ecology at F&ES, are a "revolutionary" shift in thinking on the subject. Ecosystem ecologists have long held that plants and their interaction with the soil determine the type and abundance of herbivores and carnivores in an ecosystem. Schmitz's paper, "Effects of Predator Hunting Mode on Grassland Ecosystem Function," shows that the opposite is true.

"Most ecosystem ecologists think that the supply of nutrients in plants determines who can live up

Oswald Schmitz Lab

The jumping spider preys on grasshoppers.

in higher trophic (feeding) levels," said Schmitz. "This study shows that it's the top trophic levels determining how the plants interact with the soil."

In a three-year-long experiment conducted in 14 enclosed cages at Yale-Myers Forest in northeastern Connecticut, Schmitz observed that the jumping spider (*Phidippus rimator*) prowls its neighborhood, or ecosystem, and engages in random acts of violence against its plant-eating prey, the garden-variety grasshopper (*Melanoplus femur-rubrum*).

And much like victims of crime, grasshoppers facing an imminent threat go into a heightened state of alert, taking refuge in the ecosystem's dominant plant, goldenrod. Its mobility restricted, the grasshopper dines on its own shelter, promoting habitat diversity in the process. Goldenrod's competitors—asters, Queen Anne's lace and a variety of clover and grasses—flourish, but the diversity comes at a price. With the demise of goldenrod, nitrogen—a key fertilizer in the soil's renewal—is depleted.

In the same experiment, nursery web spiders (*Pisaurina mira*), which Schmitz called "sit-and-wait ambush spiders" because they are coy about their predatory intentions, occupy a certain "bad neighborhood," enabling grasshoppers to avoid them, roam the ecosystem and eat a wider variety of plants. In this milieu, goldenrod thrives, ultimately nourishing the soil when its nitrogen-rich tissue decays.

"What's really cool here is that different spiders have different hunting modes, and it's those modes that cause grasshoppers to behave differently, which then carries down the chains of the community structure of the plants," said Schmitz. "So it's a top-down view, and in that sense it's revolutionary, because it's a paradigm change in ecosystem ecology. Plants, ecosystem ecologists say, have an indirect effect on carnivores. My research shows that carnivores have an indirect effect on plants."

Schmitz said that the study's underlying principles can apply to larger ecosystems, such as Yellowstone National Park, and have implications for conservation policies. "If elk are facing cougars, which are ambush predators, they're going to change where they are on the landscape. Whereas when elk face wolves, they may not change their location; they'll only respond to an imminent threat, because wolves are continually wandering around on the prowl."

He added, "We know that elk can have a huge impact on plant diversity and, as a consequence, on nutrient-cycling properties. And so the way they use the landscape, which depends on what predator they face, will change the local ecosystem processes."

Funding for the study was provided by the National Science Foundation's Ecological Biology program.

Agriculture Changing Chemistry of Mississippi River

Midwestern farming has injected the equivalent of five Connecticut Rivers annually into the Mississippi River during the past 50 years, according to a study published in January in *Nature* by researchers at Yale and Louisiana State universities.

"It's like the discovery of a new large river being piped out of the corn belt," said Pete Raymond, lead author of the study and associate professor of ecosystem ecology at F&ES. "Agricultural practices have significantly changed the hydrology and chemistry of the Mississippi River."

The researchers tracked changes in the levels of water and bicarbonate, which forms when carbon dioxide in soil water dissolves rock minerals. Bicarbonate plays an important, long-term role in

absorbing atmospheric carbon dioxide, a greenhouse gas. Oceans absorb carbon dioxide but become more acidic in the process. "Ocean acidification makes it more difficult, for example, for organisms to form hard shells in coral reefs," said R. Eugene Turner, a co-author of the study and a professor at the Coastal Ecology Institute at Louisiana State University.

The researchers concluded that liming and farming practices, such as changes in tile drainage and crop type and rotation, are most likely responsible for the majority of the increase in water and carbon in the Mississippi River, which is North America's largest river.

Raymond said that the research team analyzed 100-year-old data on the Mississippi River that had been warehoused at two New Orleans water treatment plants, and combined it with their own data on precipitation and water export. "A notable part of this finding is that changes in farming practices play a larger role than changes in precipitation in the increase in water being discharged into the river," he said.

The researchers used their data to demonstrate the effects of this excess water on the carbon content of the river, and argue that nutrients and pollution in the water are altering the chemistry of the Gulf of Mexico.

Besides Raymond and Turner, the other co-authors of the study, "Anthropogenically Enhanced Fluxes of Water and Carbon From the Mississippi River," are Neung-Hwan Oh of F&ES and Whitney Broussard of the Department of Oceanography and Coastal Sciences at Louisiana State University. The research was funded by the National Science Foundation.

Yale Environment 360 Debuts

Yale Environment 360, a new online environmental magazine affiliated with F&ES, is set to debut this spring.

Editor Roger Cohn said the name, *Yale Environment 360*, was chosen to reflect the fact that the new site will offer cutting-edge commentary and opinion and frontline reporting on global environmental topics. "Yale is our home base," said Cohn, the former editor of *Mother Jones* and *Audubon* magazines, "but we are looking out at the world and examining the major environmental issues of the day."

The new site, which will have the URL e360.yale.edu, will publish articles by scientists, journalists, academics and leaders in the environmental field. It will also present a variety of multimedia content, including videos, slideshows and audio, as well as a daily digest of major environmental news and science from throughout the world.

In its inaugural issues, *Yale Environment 360* will feature articles from around the globe, including environmental reporting from China, Russia and the Arctic. Among the inaugural contributors will be author Bill McKibben and Elizabeth Kolbert, a staff writer at *The New Yorker*.

Plans for launching *Yale Environment 360* have received the strong support of Dean Gus Speth and Yale President Richard Levin, who see the online publication as an integral part of Yale's effort to become an increasingly international institution and to become known as a leading green university.

Yale Environment 360 is being funded by major grants from the William and Flora Hewlett Foundation and the John D. and Catherine T. MacArthur Foundation.

Interactive Website Calculates Costs of Climate Change

A national policy to cut carbon emissions by as much as 40 percent over the next 20 years could still result in increased economic growth, according to an interactive website reviewing 25 of the leading economic models being used to predict the economic impacts of reducing emissions.

Robert Repetto, professor in the practice of economics and sustainable development at F&ES, who created the site, said, "As Congress prepares to debate new legislation to address the threat of climate change, opponents claim that the costs of adopting the leading proposals would be ruinous to the U.S. economy," he said. "The world's leading economists who have studied the issue say that's wrong. And you can find out for yourself."

The interactive website, www.climate.yale.edu/seeforyourself, synthesized thousands of policy analyses in order to identify the seven key assumptions accounting for most of the differences in the models' predictions. The site allows visitors to choose which assumptions they feel are most realistic and then view the predictions of the economic models on the basis of the chosen assumptions.

Among the key assumptions are that renewable energy technologies will be available at stable prices;

that higher fossil fuel prices will stimulate energy-saving technological change; that reducing U.S. carbon emissions will reduce economic damages from climate change and air pollution; and that the United States will incorporate international trading of emission permits into its national policy.

Even under the most pessimistic assumptions, U.S. Gross Domestic Product (GDP) would still grow by 2.4 percent per year, reaching $23 trillion by 2030 even if emissions are reduced by 40 percent below projected business-as-usual trends, as compared to historical growth rates of 3 percent a year over recent decades. Under the most favorable assumptions, GDP would rise slightly above 3 percent a year.

"The website shows that even under the most unfavorable assumptions regarding costs, the U.S. economy is predicted to continue growing robustly as carbon emissions are reduced," said Repetto. "Under favorable assumptions, the economy would grow more rapidly if emissions are reduced through national policy measures than if they are allowed to increase as in the past."

Descriptions of the 25 economic models used in the analysis can be found in *The Costs of Climate Protection: A Guide for the Perplexed*, published by the World Resources Institute in 1997, and *The Costs of Greenhouse Gas Mitigation With Induced Technological Change: A Meta-Analysis of Estimates in the Literature*, published by the Tyndall Centre for Climate Change Research in 2006. ■

Forest Destruction's Prime Suspect

continued from page 11

Science published his tart response: "[The authors] fail to even mention China's burgeoning consumption of imported timber—much of it illegally harvested—and its implications for Chinese forestry and the global environment." As long as this willful denial continues, so will China's complicity in illegal logging.

The other giant whose head seems stuck in the sand is the United States. Consumers here know little about illegal logging or certified wood. The Bush administration has denounced illegal logging but, like China, blames other countries and turns a blind eye to imported wood of questionable origin.

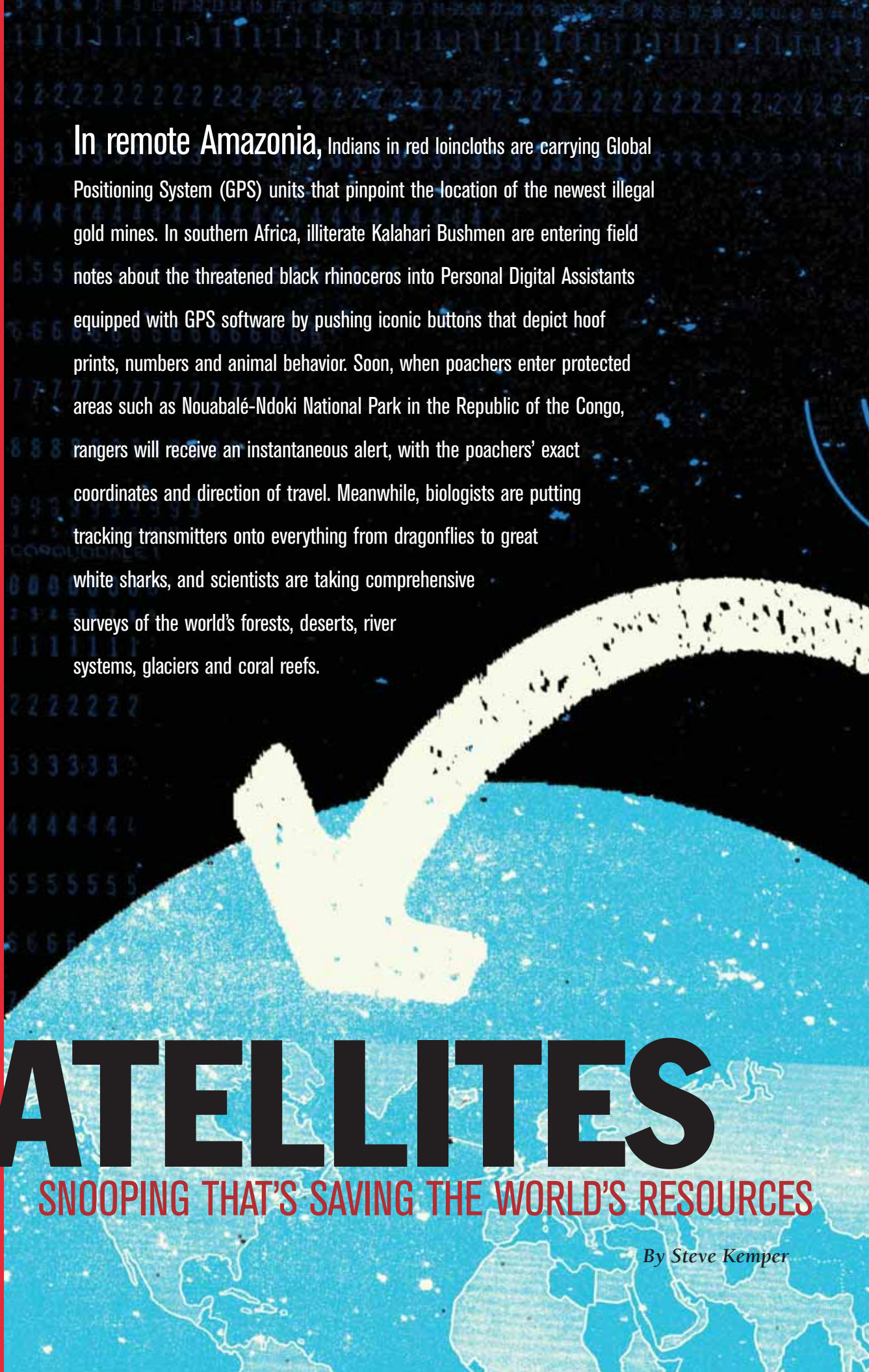
That may change. The Senate has passed an amendment to the Lacey Act that would ban the import, sale or purchase of wood products that violate foreign or domestic laws or international treaties. In short, the law would criminalize most of the wood products entering the United States from China. The House of Representatives is considering a similar measure. If passed and signed by President Bush, say environmental advocates, this could be a crucial weapon against illegal logging.

"If even a small group like EIA can track this illegal wood into Wal-Mart," says EIA's Grove, "we can give our information to the Justice Department, and they can open an investigation. The Wal-Marts and Home Depots do *not* want to think about having a Justice Department investigation against them. Once a Wal-Mart or a Home Depot starts asking its Chinese suppliers where their wood comes from and the suppliers' access to U.S. markets depends on their answer, the Chinese government might become more cooperative."

Other promising strategies include satellite technology, which can quickly detect incursions by illegal loggers (see story on page 32), and the so-called REDD mechanism (Reducing Emissions From Deforestation and Degradation). REDD was an important topic at the recent United Nations climate talks in Bali. Under this mechanism, which could become part of the next Kyoto agreement, wealthy countries would pay developing countries for every hectare of forest left standing. The payments could amount to billions of dollars—excellent motivation to protect forests.

Meanwhile the deforestation continues at a ferocious pace, as does consumption of the products that are a result of it. F&ES' Ashton points out that China is doing what Europe did in the 18th century and the United States did in the 19th century—fueling its economic growth by devouring natural resources, its own and others. Historically, he says, countries have not worried about deforestation until most of their trees are gone and they are suffering the consequences of a timber famine, such as a shortage of construction material or drinking water. In his view, this exploitative process won't be stopped by most of the solutions being proposed.

"You can talk until you're blue in the face about laws and certifications," he says, "but if you don't have strong land tenure—property rights—and enforcement of strong environmental laws, you're a goner. And those only come with poverty alleviation." A problem even harder to tackle than illegal logging. ■



In remote Amazonia, Indians in red loincloths are carrying Global Positioning System (GPS) units that pinpoint the location of the newest illegal gold mines. In southern Africa, illiterate Kalahari Bushmen are entering field notes about the threatened black rhinoceros into Personal Digital Assistants equipped with GPS software by pushing iconic buttons that depict hoof prints, numbers and animal behavior. Soon, when poachers enter protected areas such as Nouabalé-Ndoki National Park in the Republic of the Congo, rangers will receive an instantaneous alert, with the poachers' exact coordinates and direction of travel. Meanwhile, biologists are putting tracking transmitters onto everything from dragonflies to great white sharks, and scientists are taking comprehensive surveys of the world's forests, deserts, river systems, glaciers and coral reefs.

SATELLITES

SNOOPING THAT'S SAVING THE WORLD'S RESOURCES

By Steve Kemper

Alex Williamson/Getty Images

All of this is made possible by a cluster of technologies once affordable only by government agencies and large corporations: satellite imagery, remote sensing and computer-based mapping (more formally called a geographic information system, or GIS). In the past decade, the cost of these tools has dropped sharply. The price of a Landsat satellite image from NASA, for instance, has fallen to $600 from $4,400. Other tools, notably Google Earth, are free, as is much of the research being done with the help of satellites by nongovernmental organizations (NGOs) and universities.

The result has been an explosion of knowledge. Scientists can monitor changes in forest cover, Arctic ice and animal populations. NGOs and ordinary citizens are finding ways to detect environmental crimes such as illegal logging, poaching, unregulated gold mining and other depredations. In field biology, satellite tags have added immensely to knowledge about creatures that are hard to study, such as whales, mountain lions and migratory species of all kinds. Collection of field data has been transformed by combining laptops or even Palm Pilots with satellite uplinks. The technology also gives scientists a new perspective across both time and space.

"These technologies have revolutionized the gathering, planning and sharing of conservation information, both for organizations and for governments," says Susan Minnemeyer, GIS lab manager for the World Resources Institute (WRI) in Washington, D.C.

The new technologies offer new ways to survey, monitor and manage natural resources. For instance, a group of international researchers is using high-resolution images from NASA satellites to create the first survey of the world's tropical coral reefs. "We don't really know whether there are 100,000 square kilometers or 400,000 square kilometers of coral reef environments, because there are no accurate maps," says Frank Muller-Karger, lead principal investigator

"These technologies have revolutionized the gathering, planning and sharing of conservation information, both for organizations and for governments."

– Susan Minnemeyer

for the Millennium Coral Reef Mapping Project and dean of the School for Marine Science and Technology at the University of Massachusetts Dartmouth. "Our preliminary finding is that people have overestimated the number of surface coral reefs around the world." Another surprise: less than 2 percent of the reefs are in protected areas.

This new, wide-angle view alters the picture in several ways. Living reefs are crucial habitats for many sea creatures, and they serve as nurseries and feeding grounds for many others. They are also important to humans for fishing, boating and tourism. When reefs suffer or decline, so does everything that depends on them. If there are fewer reefs than expected, and if almost none of them are protected, conservation managers need to take note. Accurate information leads to a clearer picture of how fishing, boating, agricultural runoff and sewage discharge are affecting reefs over time, says Muller-Karger, and hence, to better management.

James Churnside, a senior scientist with the National Oceanic and Atmospheric Administration (NOAA) in Boulder, Colo., combined satellite imagery, remote sensing and airplanes to locate destructive ocean debris—mostly giant rolls of fishing nets—that ensnares turtles, whales, seals, sea birds and other creatures. NOAA personnel often don't find the nets until they get caught on reefs, where waves and wind turn the nets into scouring pads. In a pilot project, Churnside used ocean circulation models based on satellite data to identify areas where wind and currents were most likely to deposit debris. Airplanes with sensing equipment flew transects and received constant updates via satellite on changing conditions. It worked. Churnside is applying similar techniques to improve fisheries management, using LIDAR, a kind of radar. LIDAR shoots a laser pulse into the water, where it scatters and bounces off whatever is there, such as fish, and then returns with the information, which software interprets. By coupling the results with satellite imagery, Churnside can design more effective aerial surveys for specific fish.

Satellite technology can reveal the remote, the hidden, even the seemingly invisible. In 2005, a team led by Gregory Asner of Stanford and the Carnegie Institution showed that if a tree falls in the forest, high-resolution satellite imagery can detect it. Images of five states in the Brazilian Amazon, spanning 1999 to 2002, were so detailed that Asner's group could spot small gaps in the canopy and count the number of valuable single trees, such as mahogany, cut by loggers. "Selective logging" is hard to detect and hadn't been included in data about deforestation. Asner's group calculated that spot-cutting doubled the usual figure, because loggers typically damaged or toppled up to 30 trees while taking out one of high value.

Last year, after studying seven years of high-resolution satellite imagery of the Peruvian Amazon, Asner's group reported that unprotected areas were 18 times more likely to suffer deforestation than protected areas, which accounted for just 1 to 2 percent of "forest disturbance" in the region. Indigenous territories also showed considerably less destruction. Together, the satellite findings make clear that protecting forests and giving land title to indigenous peoples can curb deforestation.

Satellites permit scientists to stay on top of sudden changes in forest cover. The deforestation rate in Brazil fell by more than 60 percent between 2004 and 2007. Experts suspected that the drop correlated with depressed prices for farm products such as meat, grains and soybeans, which made it uneconomical to clear more trees for farms and ranches. In the second half of 2007, when the markets for meat and soy boomed, satellite imagery revealed that trees were falling again at a tremendous rate, confirming the link between market forces and deforestation.

High-resolution optical images do have a drawback: clouds can block the view, especially in the tropics during the rainy season. Getting a clear composite of such an area might take several years. That has recently changed. Japan's Advanced Land Observing Satellite carries an imaging sensor that uses radar, which isn't foiled by clouds, rain or darkness. This allowed the radar satellite to take clear images of the entire tropics in three months.

"This marks a new era," says Josef Kellndorfer, of the Woods Hole Research Center. "It gives us observations of the entire globe several times a year, in a short amount of time, and you can repeat that next year and the year after that, to get really narrow observation time frames."

Kellndorfer and his group used the radar imagery to create the first large-scale mosaic of the Xingu region in the Brazilian Amazon—more than 150,000 square miles. The mosaic caused a sensation at the climate conference in Bali in December. The radar technology is so advanced, and the satellite's orbit is so precise, that Kellndorfer's group made the map in about 20 hours. "In the old days," he says, "armies of students spent a lot of time doing geometric rectification work to make sure the satellite images fit together with the map data."

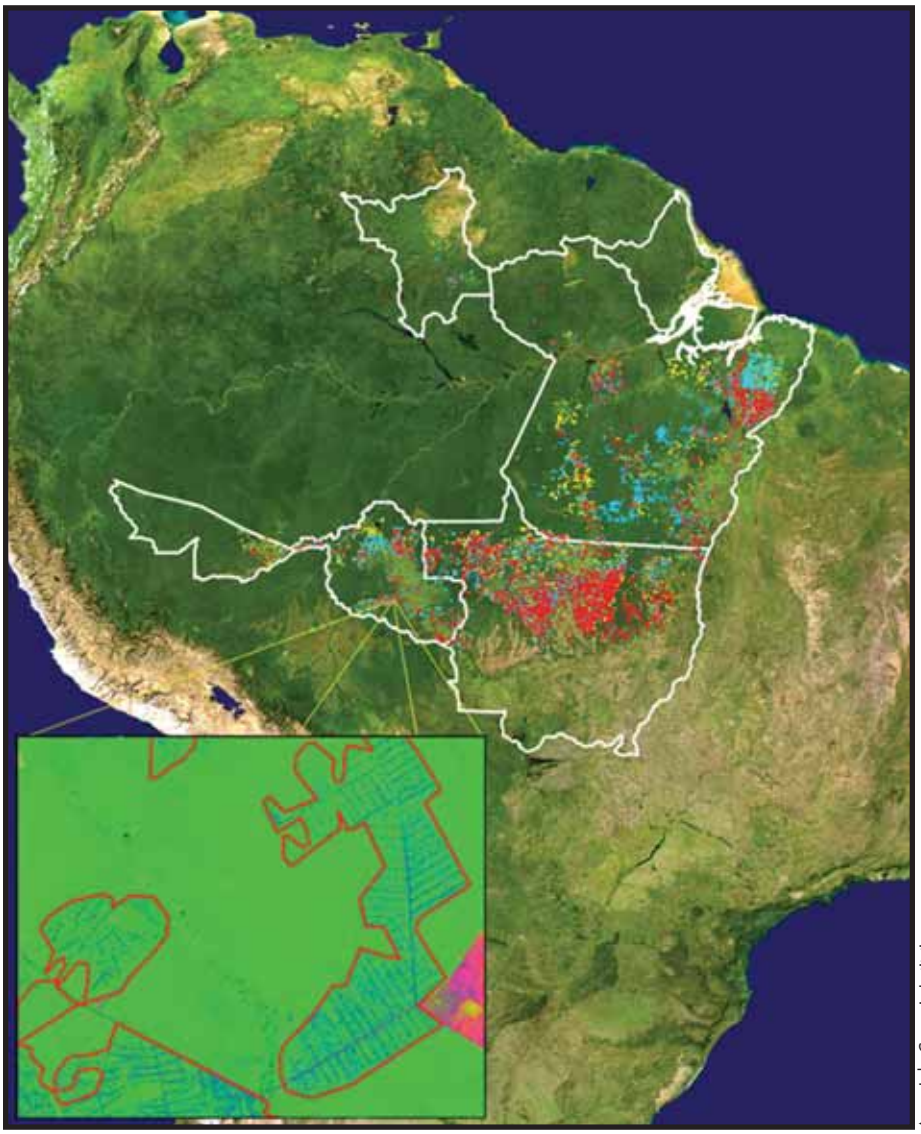
Kellndorfer says that Brazil may soon integrate radar into its satellite system

called DETER, "a sort of early-warning system for illegal logging." The rainy season now stymies DETER. "But with cloud-penetrating radar," says Kellndorfer, "you can find illegal operations fairly fast. Radar is the missing piece to the puzzle. We can really strengthen global forest monitoring capacity tremendously."

Computers can turn satellite data into detailed digital maps that display information visually—changes in forest cover from year to year, density of vegetation, movements of tagged animals, locations of mines or logging roads. Such maps can be used to monitor and manage natural resources, or as evidence of mismanagement and criminal activity. They also can have a stronger impact than a report full of statistics and graphs.

At WRI, Susan Minnemeyer's group has been making maps of logging roads in central Africa. Such roads reveal incursions by illegal loggers into protected areas, and they also show whether logging companies are staying within their concessions. "We make this tracking information available so we can hold governments and companies accountable for how forests are being managed," says Minnemeyer.

The first atlas, for Cameroon in 2004, found 1,800 kilometers of illegal logging roads. Word quickly spread that the government could now detect prohibited activity. "And since then, I don't think we've mapped any roads in parks," says Minnemeyer. "Logging in these areas has virtually disappeared." Before the atlas, logging companies often cut outside their concessions, in protected areas or community forests, and then claimed confusion about precise boundary lines. WRI's map ended that practice.



Asner Lab, Carnegie Institution

Selective logging in the Brazilian Amazon increased from 2000 (red), to 2001 (blue), to 2002 (yellow). Inset: logging is mapped down to individual roads, skid trails, log landings and tree-falls.

Satellite imagery also shows governments and NGOs what's going on across the entire Congo basin in terms of deforestation and road building. "Before, we needed to piece together various written reports from ministries and the FAO [Food and Agriculture Organization of the UN]," says Matthew Steil, who works with Minnemeyer on WRI's forest initiative in central Africa. "Now we can do it much more accurately. We're able to understand what the true threats are, so we can set conservation priorities and target our actions."

WRI updated the Cameroon atlas in 2007 and recently finished one for the Republic of the Congo. The group will also produce maps for Gabon, the Democratic Republic of Congo and the Central African Republic. Central Africa is being deforested at a ferocious pace, which Minnemeyer and Steil hope these maps can help slow. They are also training people who knew nothing about computers two years ago but now, because the software is so user-friendly, can digitize road atlases from satellite data.

The Amazon Conservation Team (ACT) is also getting results by putting these new tools into the hands of people with no technological experience. ACT, which works on conservation issues with indigenous peoples, has taught Indians from remote tribes in Brazil, Suriname and Colombia how to use GPS units and the Internet to map and protect their territories.

"More lands have been claimed with maps than with bullets and swords," says Mark Plotkin '81, an ethnobotanist

and president of ACT. "In the industrial world we don't worry about coming home to find squatters living on our land, or cutting our trees, or mining gold in our rivers. But Indians do. When you map your land, you take claim to it in a way you didn't before. So a map is not just a map. It's a management plan and an education plan."

The Indians use the GPS to mark streams, hunting areas, sacred spots and resources such as Brazil nut trees. The data are uploaded to a satellite and downloaded onto computers, where GIS software generates detailed maps. So far, ACT has helped 27 tribes map territories encompassing millions of acres. The group works with the relevant governments to get the maps classified as official.

ACT also persuaded Google to provide high-resolution satellite imagery of Brazil and Suriname through Google Earth. Tribal members periodically visit one of ACT's six offices to study their lands on Google Earth for new signs of logging or mining: roads, airstrips, disturbances in the canopy, discolored rivers. They can detect even the smallest mines and logging camps. Back at home, they use a GPS to locate the spot and confirm the suspicious activity. Then they either notify the local authorities and provide the exact coordinates, or they devise their own solutions.

"Revolutionary imagery that was basically spy technology a few years ago is suddenly at everybody's fingertips."

–John Amos

For instance, a tribe in the Tumucumaque region on the Brazil-Suriname border used Google Earth to detect gold miners infiltrating one of the most remote areas of its territory. It turned out that the miners had breached the territory by cutting a portage around some severe rapids that formed a natural barrier to the Indians' land. So the Indians put a village there. "There's still a portage point," says Plotkin, "but nobody is sneaking through it anymore." The tribe has established guard posts at other spots that showed signs of encroaching mining.

"The future of the rainforest is in the indigenous lands and private reserves," says Plotkin. "Five percent of the Amazon is national parks and 25 percent is indigenous reserves. Do the math." He's convinced that indigenous presence combined with Western technology is the best conservation plan.

That's John Amos' plan too. He's founder and president of SkyTruth. "We were established with the idea that anybody on the planet who cares about what's happening to our environment should be able to see it with their own eyes," he says. To that end, SkyTruth provides satellite imagery, GIS maps and other visual information to NGOs working on conservation issues.

Before starting SkyTruth in 2001, Amos spent 10 years providing similar services to oil, gas and mining companies that wanted to find and exploit natural resources. He grew increasingly disturbed by the imagery he found—oil slicks at sea, severe destruction at mining sites, deforestation all over. Then came what he calls his "epiphany," caused by a satellite image of the devastation around Mount St. Helens—not the area flattened by the eruption, but the much bigger area of destruction caused by clear-cuts in the surrounding national forest. "And this was on public land," says Amos. "Yet none of the shareholders in this national trust had a clear idea it was happening. That made me start thinking that this type of imagery needs to be out in the public domain, freely and easily available to any schoolchild or American taxpayer who has an interest."

NGOs come to SkyTruth for images that tell a story about an issue—for instance, drilling by oil and gas companies. SkyTruth's images taken over a five-year period in the West illustrate how quickly the energy industry is putting footprints all over public lands there. The next thing people always want to see, says Amos, is what a place will look like five years from now.

SkyTruth produced imagery showing the proposed Pebble Mine, which would be the largest open-pit gold mine in the hemisphere, and what the site looks like now—wilderness—and then digitized the company's mining plan and overlaid it on the present. The mine would sit in the headwaters of southwest Bristol Bay, critical habitat for Alaska's sustainable salmon fishery.

When the "before" image was projected at a meeting in Anchorage, elders from a dozen communities near the proposed mine excitedly walked up to the wall and began pointing out details: "This is where we pick berries every summer; this is the stream where my son killed his first moose." The next image showed the same area with the footprint of the mine plan on it. The mining pit, waste piles and tailings ponds obliterated many of the places that the elders had been pointing to moments earlier. The local people had generally supported Pebble Mine because of the economic benefits promised by the mining company, but that single image changed everything. "Imagery is powerful and creates an emotional response," says Amos. "I think this technology will be an increasingly ubiquitous tool in engaging the public on a whole range of issues."

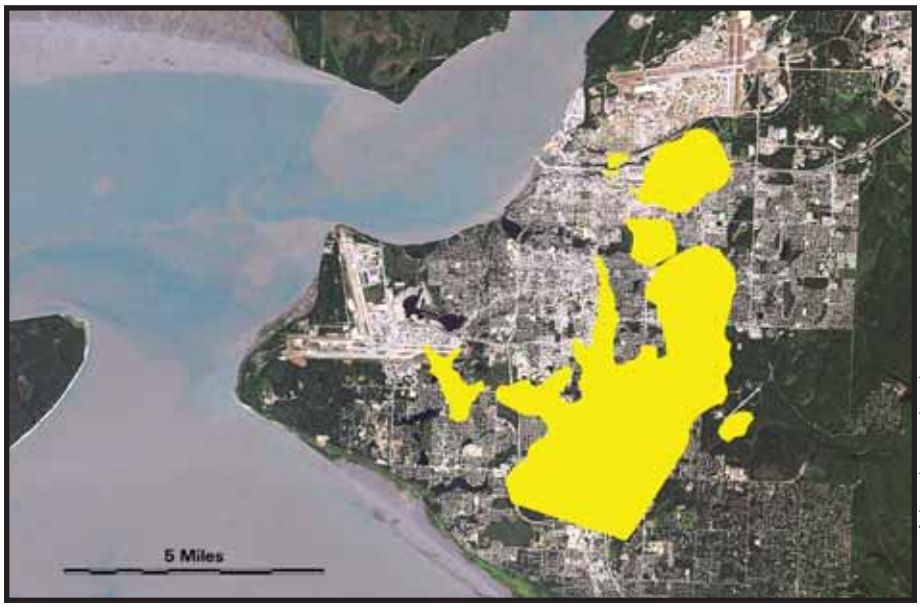
Consider Google Earth. As of last June, according to Google, more than 200 million unique IP addresses around

the world had downloaded the free software. "Revolutionary imagery that was basically spy technology a few years ago is suddenly at everybody's fingertips," says Amos. He is now working on a way to combine this technological power with the surging popularity of social networks, wikis, blogs and digital photos to create "an army of citizen environmental witnesses." Satellite imagery tells a more complete story, he says, if it's bolstered by photos taken from low altitude—from a plane or on the ground.

For the gas fields in Wyoming, for instance, SkyTruth has satellite images showing white dots connected by thin white lines, but also aerial photos that turn the dots into drilling pads that cover three acres and the lines into roads 50 to 100 feet wide. Amos wants to add photos taken by people on the ground that show all the trucks, equipment and open pits of drilling fluids. He envisions people uploading such pictures to a photo-sharing site. SkyTruth would then add them to its visual file on that location. "If this capability had existed in 1994, it wouldn't have taken 10 years for people to hear about this explosion of oil and gas drilling on public lands in the West," he says. "The world can't wait for 10 years anymore. Our time horizons for taking effective action are getting shorter all the time."

Satellite imagery is allowing conservation biologists to monitor changes in critical habitat. In the last decade, for instance, habitat suitable for tigers has shrunk by 40 percent, and satellite data indicate only four remaining areas that can support the world's last 500 tigers. Satellite imagery shows orangutans in a similar predicament; illegal logging in Southeast Asia is destroying the ape's habitat so quickly that the animal might be extinct in the wild in 20 years.

Satellite imagery also makes clear that logging and agriculture in central Africa are threatening the other three great apes—gorillas, chimpanzees and bonobos. As part of the conservation effort for these animals, scientists are using satellite data to create vegetation maps. Every plant reflects a particular spectrum of light, which allows scientists to inventory and map, say, the density of a gorilla's favorite foods, such as stinging nettles, wild celery and thistles. The map tells scientists how much "carrying capacity"—food and shelter—an area can provide and indicates which areas are worth protecting.



Courtesy of SkyTruth (www.skytruth.org)

The satellite image of Anchorage, Alaska, shows the size of the proposed Pebble Mine (yellow). Support for the largest open-pit gold mine in the hemisphere decreased after residents saw its footprint in this satellite image.

Chris Raxworthy, a biologist at the American Museum of Natural History in New York City, concerned about the swift destruction of Madagascar, has developed a program that combines satellite data with software to predict which specific areas of the island are most likely to contain new species of chameleons (his research interest). When he tested the model in the field, he found seven species unknown to science. The program saves time, money and, perhaps, habitat and species.

After seeing hundreds of African elephants massacred by poachers, Steve Gulick invented a small device that uses satellite technology to expose poachers through their killing tools—guns, snares and machetes. Called TrailGuard, it contains magnetic sensors that detect iron. When poachers trigger the sensor on a trail—in Africa's dense forests, all human travel is along trails—the device transmits a signal to a satellite gateway hidden in the canopy, which relays it to the satellite. The satellite beams an alarm message to the authorities via computer, satellite phone or pager. The message contains the number of intruders, their exact location and their direction of travel. With this early warning, rangers can be dispatched to head off the poachers before the killing starts or at least to capture them afterward. "Essentially it's a burglar alarm for parks," says Gulick, now a visiting scholar at the College of Environmental Sciences and Forestry, State University of New York. People authorized to be in the park—rangers and researchers—would carry a small transponder recognized by the sensor.

Gulick has successfully tested TrailGuard in two African parks, and he expects it to be in production by this summer. Demand is already strong. "In the last year, because of publicity, none of which I sought," he says, "I've had inquiries from parks in 24 countries." Gulick expects the device to cost about $1,000. The trails leading into a park typically are few and start from a village, so an entire park often can be protected by a dozen TrailGuards. This is crucial in

continued on page 57

class notes

1942

Gayley "Crock" Atkinson is a retired consulting forester. He spends summers at his cabin in northeast Pennsylvania and the rest of the year in Gwynedd, Pa., where he resides in a Quaker-supported senior center on 159 acres of land. There he grows food and flowers. His three sons and three daughters have provided him with many grandchildren.

1946

Class Secretary
Paul Burns
pburns@lsu.edu

Paul Burns, Ph.D. '49, moved in September to an apartment in the independent-living section of a retirement center. Paul goes nearly daily to his office at nearby Louisiana State University, where he reviews manuscripts prepared for publication. Competing in the Louisiana Senior Olympics last fall in the 85-to-89 age class, he won medals in tennis, table tennis, badminton, pickle ball, track and billiards. In November, he was interviewed about his World War II experience for the "Veterans History Project," a Library of Congress project. Sometime early this year, the interview will be posted on the Internet, alongside his memoirs on WWII titled "Paul Burns Collection: Veterans History Project (American Folklife Center, Library of Congress)." Paul would like to know of other Yale F&ES alumni who have been interviewed for this project. ■ **Dave Smith, Ph.D. '50**, is wheelchair-bound in the nursing home part of his retirement community in Hamden, two miles north of F&ES. His wife remains in their independent-living apartment there. Dave maintains some contact with his F&ES successors and former students by e-mail. He is much impressed with what **Mark Ashton '85, Ph.D. '90**, has accomplished with his program and new facilities at the Yale Forests, as well as with the forestry program and other developments at the school.
david.m.smith@wcres.org

1947

Class Secretary
Evert Johnson
swede-doc@mindspring.com

1948 *60th Reunion Year*

Class Secretary
Francis Clifton
fhcpbyfor@webtv.net

George Hindmarsh writes: "Janet, my wife of 64 years, died on December 24. The family now comprises five daughters, five granddaughters, six grandsons and three great-grandsons. My golf handicap keeps rising, and I am not catching as many fish. When I wake up in the morning, it takes me a while to straighten out my back. I must be one of the last of our F&ES Class of 1948. Where is **Cy Young**? Last I heard he was wintering either in Sarasota or Bradenton. He was a popular guy and should be heard from." ■ **Steve Pryce** writes: "What's to tell? Good fortune allows me to continue to be active. I get in my daily swim and weekly golf, and continue tutoring ESL, as I have for the last 20-some years. The closest I get to forestry is being in charge of the tree committee in our housing association in Carlsbad, Calif."

1950

Class Secretary
Kenneth Carvell
kencarvell@aol.com

1951

Class Secretary
Peter Arnold
arnoldp@nccn.net

1952

Class Secretary
Milton Hartley
redheded@olympus.net

John Calhoun Jr. writes: "My wife, Helen, and I split our time between RiverMead, a three-stage retirement community in Peterborough, N.H., which is not far from our longtime home in Gilsum near Keene, N.H., and a summer/winter place on Kezar Lake at Center Lovell, Maine (in sight of "the Whites"). While we have withdrawn from track events and ski races, we are in reasonable shape and in touch with family and old friends, although that list has shortened up unreasonably, of late. Thank heaven that Yale is now involved in green projects in its buildings and programs to demonstrate a sustainable way."

1953 *55th Reunion Year*

Class Secretary
Stanley Goodrich
slgmyg.good@quest.net

Earl Raymond writes: "Thanks to Kath Schomaker for including me in the dinner at Mory's with Jim Fickle at Reunion Weekend 2007. It moved me to see **Perry Hagenstein** again—50-plus years does not change much with old friends. I backpacked in Tanzania beginning in early January for a couple of months."

1955

Warren Doolittle, Ph.D., and wife, Jane, celebrated their 65th wedding anniversary on December 29, with a dinner party at the Dominion Valley Country Club House in Haymarket, Va. They were married at the Embury Methodist Church in Freeport, Ill., in 1942. Both are graduates of Iowa State University, and Warren received a master's degree from Duke University. Following a tour of duty in WWII in heavy bombers in Europe and Korea, he settled with Jane in Asheville, N.C., where he was a scientist with the U.S. Forest Service. Other duties with the Forest Service took them to Upper Darby, Pa., and Washington, D.C. He retired from the Forest Service in 1980 but continued activities in forestry as a volunteer until 2003. He was president of the Society of American Foresters in 1986 and president of the International Society of Tropical Foresters from 1983 to 2003. Jane devoted her time to their three children and her husband. She was a member of several organizations, including the Daughters of the American Revolution, and she was a Nationally Accredited Emeritus Flower Show Judge.

1956

Class Secretary
Jack Rose
jackarose@sbcglobal.net

1958 *50th Reunion Year*

Class Secretary
Ernest Kurmes
ernest.kurmes@nau.edu

Ernie Kurmes received a certificate for 50 years of membership in the Society of American Foresters from J.J. Smith, chair of the Northern Arizona Chapter, on December 6. To see a photo of the presentation, visit http://forestry.yale.edu/ and go to "Alumni/ae," then "Class Pages and Photos."

1959

Class Secretary
Hans Bergey
hberg16@aol.com

1960

Class Secretary
John Hamner
Jhamner1@bellsouth.net

1961

Class Secretary
Roger Graham

1962

Class Secretaries
James Lowe

Larry Safford
lsaffordnh@earthlink.net

1963 *45th Reunion Year*

Class Secretary
James Boyle
forsol40@comcast.net

Terry Blake writes: "I have been a professor of plant physiology at the University of Toronto for the past quarter century. My wife, Rosemary, and I recently started a sabbatical, spending several months at Griffith University, Brisbane, where I am an adjunct professor. During this time, we also visited our daughter and two granddaughters in Queenstown, New Zealand, and our son, Paul, who is a recent law graduate from my alma mater, Sydney University. We returned to Toronto to arrange an October launch for Rosemary's book of poetry, *Wintering*, which contrasts experiences and loss in two hemispheres. We will continue our sabbatical at Melbourne University School of Forestry, where I will complete work on a book on the eucalyptus."
terry.blake@utoronto.ca

1965

Class Secretary
James Howard
jhoward@sfasu.edu

Bob Kreitler, who moved into the world of financial planning some 20 years ago after a 20-year career in natural resources, led an effort to establish national savings guidelines with the help of Roger Ibbotson of the Yale School of Management, Peng Chen and James Jong of Ibbotson Associates and Bob's son Charlie Kreitler. Morningstar has more information about it on its website, as well as an easy-to-use calculator. On a social note, Bob and his wife, Bonnie, had dinner with Nina and **Stephen Ollerenshaw** on their recent visit to the States. Both are in great spirits, and Stephen reports that he is still body surfing in Australia.

1966

Class Secretary
Howard C. Dickinson Jr.

1967

Class Secretary
Robert Hintze
bclues@aol.com

1968 *40th Reunion Year*

Class Secretary
Gerald Gagne
gerald.gagne@sympatico.ca

1969

Class Secretary
Davis Cherington
cheringvt@aol.com

1970

Class Secretary
Whitney Beals
wbeals@newenglandforestry.org

1971

Class Secretary
Harold Nygren
tnygren@juno.com

Roy Deitchman is the vice president of environmental health and safety at Amtrak in Washington, D.C. He has worked at Amtrak since 1999.

■ **Coleman Holt** writes: "Since mid-1991, I have been a sole proprietor in environmental issues for public agencies and private land developers and landowners. About 12 years ago, my wife, Shirley, and I bought, built on and moved onto 10 acres about 20 miles northwest of Winter Park in Orlando, Fla., near Mt. Dora. During my stint in consulting—21 years thus far—work has kept me about half the time out in the wild pine flatwoods, sand scrubs, cypress ponds, bayheads and hardwood hammocks among deer, turkey, bear, gopher tortoises, scrub jays and cottonmouths. The other half has been consumed by preparation of reports, meetings and other tasks, the primary purpose of which has been to legitimize yielding to the lure of the former half."

1972

Class Secretary
Ruth Hamilton Allen
ruth.allen@aehinstitute.com

1973 *35th Reunion Year*

Sam Hopkins writes: "Last year, I celebrated my 33rd anniversary working for the Westervelt Company (formerly Gulf States Paper Corporation). I got married on January 26. My wife, Lois, moved from near Charleston, S.C., and works in nursing here in Tuscaloosa, Ala."

1976

Tom Barounis writes: "Diane and I will celebrate our 33rd anniversary this year. (We met in Helen Hadley Hall.) Our son, Timothy, is a second-year medical resident. Our daughter, Cynthia, is a fourth-year graduate

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

student in English at the University of Illinois, Chicago. *Tempus fugit*. I work for the Environmental Protection Agency Superfund program in Region 5, and we are busy cleaning up uncontrolled hazardous waste sites. To all at the school: Keep up the good work." barounis.thomas@epa.gov

■ **Colin Peterson** writes: "I relocated to Prattville, Ala., from a temporary assignment as fiber supply manager in Terre Haute, Ind., when International Paper closed this older paper mill. Soon thereafter, I 'retired'—after 36-plus years of service with IP—and I'm really enjoying the time off! Plans are to sell our house by this summer and for Sandy and me to move back to South Carolina, where our four daughters and five grandchildren live. I hope to stay retired, spend time enjoying our children and grandchildren and get involved again in charitable work in Georgetown, S.C." ■ **Patrick Reddy** writes: "Since 1990, I have worked at Colorado's Air Pollution Control Division. I am a senior air quality meteorologist, with responsibilities in air quality forecasting, emergency response meteorology and air quality research. This research includes development of methods for forecasting ozone and haze, statistical analysis of the causes and sources of haze in wilderness areas and the removal of the effects of weather in long-term records of ground-level ozone. Susan and I live in the woods on the very edge of the Pike National Forest and have dodged our share of forest fires and flash floods. I loved my class in silviculture, but when it came to creating defensible space around my house, it was clear that all I had to do was cut the small ones! I have launched a side career in nature and wildlife photography and videography. My first short film, *Dreaming of Sea Turtles*, was presented at the Eighth Annual San Diego Undersea Film Exhibition last October."

1977

Class Secretary
James Guldin
jguldin@prodigy.net

Bob Arnold writes: "I've been using my economic studies at Yale much more frequently than my environmental science. I'm the director of financial services for Business Tax Solutions. We are a midsized accounting firm on Mercer Island, Wash., near Seattle. I also own a small private money management company, First Wealth Care. I also do a bit of teaching at City University of Seattle in its graduate school of management. Most of my environmental experience these days is just enjoying it, fly-fishing and exploring ghost towns. I've recently been elected chair of the Pacific Northwest Region of the Rolls-Royce Owners' Club. It's an active group, with classic car tours nearly every month." rarnold@firstwealthcare.com

■ **Keith Aubry** has worked in Olympia, Wash., as a research wildlife biologist for the U.S. Forest Service's Pacific Northwest Research Station since 1987. He writes: "My primary research activities have been focused on ecological studies of wildlife species of conservation concern in the Pacific Northwest, including the pileated woodpecker and fisher and Canada lynx. I am directing the first radio telemetry study of wolverines in the Pacific states in the North Cascades of Washington. In addition, we have determined that wolverines are closely tied to late-spring snow cover, and are using that information to model the potential effects of global warming on wolverine distribution throughout their range." ■ **Sharon Friedman** writes: "I'm in Golden, Colo., and I am working for the Forest Service as the director for planning in the Rocky Mountain regional office. The Rocky Mountain region includes part of Wyoming and all of Colorado, South Dakota, Nebraska and Kansas, where the Cimarron National Grasslands is located." ■ **Jim Guldin** writes: "I am supervisory ecologist and project leader for SRS-4159, Ecology and Management of Southern Pines (informally the ArkLaTex unit), for the southern research station of the Forest Service. My research interests emphasize ecology and silviculture of southern pines, centered on the Crossett Experimental Forest in Ashley County, Ark., and elsewhere through the West Gulf region. This Crossett connection continues a long history of Yale-educated foresters in southern Arkansas, a professional fascination that no doubt derives from loblolly growing way faster than northern conifers! But I miss autumn in northern hardwoods, snow, eastern white pine and maple syrup." ■ **Angus Laird** writes: "After Yale, I spent a short time as a land-use policy and planning consultant and nonprofit director, received an M.B.A. from the University of Oregon and then devoted most of my career to management consulting, problem-solving and entrepreneurship in the energy field, primarily based on the West Coast. I have taken early retirement to care for a failing parent and to pursue a long-time interest in developing an energy farm in the Sierra Nevada foothills of California. Our farm will combine elements of permaculture, deep ecology, sustainability and CleanTech on a single-family organic farm, and will be one of many similar demonstration projects designed to provide some answers to questions about life in a post-fossil fuel world." ■ **Roger Wilde** writes: "I am a certified public accountant and am accredited in business valuation by the American Institute of CPAs. I have found my education from Yale to be very useful in my profession, because I still use my natural resource economics, statistics/sampling, land use and environmental education to understand and analyze the various businesses and real estate holdings I value."

1978 *30th Reunion Year*

Class Secretaries
Susan Curnan
curnan@brandeis.edu
Marie Magleby
lomamag@aol.com
Regina Rochefort
regina_rochefort@nps.gov

Rosine Hall writes: "I have been asked by my university to lead a study-abroad program that will take place in May, when I will have the

opportunity to take some students to Egypt and study water and environmental issues." ■ **Dora Lee** writes: "I was in Italy for the better part of April, and am leading the negotiations on some compliance issues with county governments."

1979

Class Secretary
John Carey
carey@aya.yale.edu

1980

Class Secretary
Sara Schreiner-Kendall
sara.kendall@weyerhaeuser.com

Susan (Suey) Braatz moved back to FAO's headquarters in Rome from its regional office in Bangkok about a year ago and is in charge of forests and climate change. In her spare time, she is renovating an old farmhouse in Orvieto, which she hopes will be ready for visitors by this summer. ■ **Bob Comer** worked for a time as general counsel and deputy federal coordinator for the Office of the Federal Coordinator for Alaska Natural Gas Transportation Projects, which was just established by Congress. When that stint ended, he returned to Colorado to his position as regional solicitor for the Department of the Interior. He recently visited with classmates **Bobby McKinstry** '79, J.D. '79, and **John Echeverria** '81, J.D. '81. ■ **Rubén Rangel** writes: "My family and I are happy to have **J. Kathy Parker** '81, Ph.D. '85, and her husband, Max McFadden, living nearby. They moved to Santa Fe, N.M., this year, and they love it here. Kathy does volunteer work at my wife Beatríz's school. Kathy shares her experiences as a world traveler and the items that she has collected over the years with the school kids and my children. My daughter, Daniella, graduated this year and started her science studies at the University of New Mexico. My son, Dante, is a high school junior and excelling in his academics and extracurricular activities. I work at Los Alamos National Laboratory as a health physicist. I enjoy my new motorcycle and old cars. Beatríz and I ride across New Mexico to explore and take in all of its natural beauty." ■ **Susan Shen** is at the World Bank in Washington, D.C., and is leading the environment and natural resources management work in the East Asia and Pacific region, dealing with issues concerning forestry, biodiversity, air and water pollution and climate change. ■ **Jane Sokolow** is working to keep casinos out of the Catskills. The decision to put one at the old Monticello Racetrack is in the hands of the Department of the Interior. She is very active in northwest Bronx community issues—water, stormwater management, zoning, regulations for buildings and the environment. ■ **Jean Tam** writes that she and her husband spent five months in the fall of 2006 and the spring of 2007 on a flying, biking and birding trip. In the fall, they flew their small plane from Anchorage to the East Coast, visiting many friends and relatives along the way, including a visit to **Keith Stewart**'s farm. Last spring, they flew through the Midwest to Texas, then up the West Coast and back to Alaska. They traveled with their folding Montague bicycles and biked 800 miles, many on trails. For more details and photos, see the blogs. http://scott-and-jeans-flying-trip.blogspot.com/ and http://scott-and-jeans-flying-trip-2.blogspot.com/

1981

Class Secretaries
Fred Hadley
Mrm@evansville.net

Gail Reynolds
Gail.kalison.reynolds@aya.yale.edu

Keith Balter has moved to Portland, Ore., where he works for a timber investment management company. ■ **Mark Hitchcock** is living in Skagit Valley, Wash., and is a forest consultant. ■ **Ken Osborn** is working with a German family's forest investments in Skagit County, Wash., and North Island, New Zealand.

1982

Class Secretaries
Barbara Hansen
bjhansen@fs.fed.us

Kenneth Osborn
forstman@fidalgo.net

Ada Ndeso-Atanga writes: "In 2007, I served in Kenya for five weeks at the World Agroforestry Centre to support preparations for the first global workshop on improving forestry education, held in September. This workshop was organized under the auspices of the International Partnership for Forestry Education. Later in the year, I was at Principia College in Elsah, Ill., as a visiting faculty scholar for the fall quarter. I have since returned to Accra, Ghana, where I continue to work for the United Nations Food and Agriculture Organization as a consultant with the forestry technical team." ■ **Kent Wommack** writes: "After two years in Brisbane, Australia, where I opened The Nature Conservancy's first office, I'm back in Maine with **Gro Flatebo** and our family. I am now director of the conservancy's program in Canada, where it works with First Nations and others in the Northwest Territories and on the British Columbia coastline. Gro is busy with community and conservation boards and is in a master's program in creative nonfiction writing."

1983 *25th Reunion Year*

Class Secretary
Stephen Broker
ls.broker@cox.net

1984

Class Secretaries
Therese Feng
therese_feng@yahoo.com

Roberta Tabell Jordan
rjordan@clinic.net

Dave Gibson writes: "On December 10, I became a senior project officer in the International Finance Corp.'s Environment & Social Development Department, supporting forestry, biodiversity and climate-change lending innovation. IFC is the private lending arm of the World Bank."
dgibson1@ifc.org;
davegibson3@gmail.com

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

class notes

1985

Class Secretary
Alex Brash
abrash@npca.org

Deborah Fleischer writes that she is a program director at the Institute at the Golden Gate, a new environmental institute located at Fort Baker in the Golden Gate National Recreation Area. The institute will be a catalyst for action to advance the health, sustainability and protection of the environment. She is leading a team to develop initial environmental programming and activities. Deborah@greenimpact.com

1986

Class Secretary
Caroline Norden
cnorden@maine.rr.com

Ken Andrasko writes: "I'm leaving EPA and moving on to the World Bank."

1987

Class Secretaries
Christie Coon
cacoon7@aol.com

Melissa Paly
mpaly@aol.com

Dan Nepstad, Ph.D. '89, is an ecologist with the Woods Hole Research Center in Massachusetts. He joined a team of 30 researchers in November in the Amazon basin to study how burning forests contribute to climate change, as well as how to slow or stop those fires.

1988 *20th Reunion Year*

Class Secretaries
Diane Stark
salserad@yahoo.com

Philip Voorhees
pvoorhees@ncpa.org

Eric Dolin received an honor from the *Los Angeles Times* for his book, *Leviathan: The History of Whaling in America*, which was named among the newspaper's choices for "the best nonfiction of 2007."

1989

Class Secretaries
Susan Campbell
susan.campbell@comcast.net

Jane Freeman
jane@ewalden.com

Judith Moore is a senior environmental specialist and team leader of the Corporate Environmental and Social Responsibility Program for the World Bank.

1990

Class Secretaries
Judy Olson Hicks

Carolyn Anne Pilling
capilling@gds.org

Jonathan Labaree writes: "We adopted a baby boy from Guatemala this year. My wife, Lalla, and our daughter, Olivia, 4, lived down there for four months beginning in January 2007 to care for the little guy while the lengthy legal process unfolded. I made several trips down to where they were living in Antigua, outside Guatemala City, and we all came home in mid-May. Benjamin Alejandro Carothers Labaree turned a year old in September. To see the photo, visit http://forestry.yale.edu/, go to "Alumni/ae," then to "Class Pages and Photos." On the professional front, Maine Coast Heritage Trust's ties with F&ES continue to grow. We recently had Professor Brad Gentry participate in a special meeting of our board and council to lead us through a discussion of how global climate change may affect our work and what we ought to be doing to prepare. He was masterful, and the ensuing discussion was terrific."

1991

Class Secretary
Richard Wallace
rwallace@ursinus.edu

Betty (Kim) Charnon writes: "**Tim Charnon** and I are working for the Forest Service in Girdwood, Alaska. We have two boys, Dylan, 9, and Jacob, 7. We ski about 75 days a year and like to think we ski more than anyone else with a full-time day job. Tim manages the recreation department, and I am an ecologist. We just had a great visit with **Linda Lind '90** in Utah." ■ **Creed Clayton** writes: "I'm in Colorado working for the U.S. Fish & Wildlife Service in one of the relatively new energy pilot offices. I review natural gas drilling and pipeline projects for compliance with the Endangered Species Act and Migratory Bird Treaty Act. My wife, Bridget, also works in the pilot energy office here for the Bureau of Land Management. We have a 7-year-old son in second grade." ■ **Diane Duva** writes: "I am living in Connecticut with my husband, Paul, who teaches sixth grade science, and our children, Eleanor, 8, and Joseph, 10. We are joyfully embracing the peak of childhood fun—sledding, bikes, silly jokes, soccer, swimming in the lake, etc. For the past 15 years, I have been at the Connecticut Department of Environmental Protection, helping manage the solid waste, recycling, hazardous waste and pesticide programs. We recently amended Connecticut's Solid Waste Management Plan and set a goal of almost doubling our waste diversion rate, to 58 percent, by 2024, and we are revising how we manage contaminated soil and sediment in the state. We are working to increase electronics recycling, hopefully before everyone starts tossing their analog televisions." ■ **Jennifer Greenfield** writes: "I am living in the Bronx with my husband and two kids, 9 and 5. Last July, I celebrated my 10th anniversary with the New York City Department of Parks & Recreation. Mayor Bloomberg's sustainability plan for the city has set a goal for planting 1 million trees in the next 10 years, and he funded 60 percent of that goal through Parks. This means 220,000 new street trees and 2,000 acres of reforestation. I am temporarily directing this MillionTreesNYC program, and then I will move over to direct the street tree-planting program. I am working alongside **Bram Gunther**, deputy chief of forestry and horticulture for the agency, and **Fiona Watt '95**, chief of forestry and horticulture. Other F&ES grads in the mix are **Sarah Bendit '05, Stephanie Horn '06** and **Laura Wooley '04**." ■ **Mark Harding** writes: "I spent a few years on commercial fishing vessels in the Bering Sea and Gulf of Alaska before parlaying that into teaching cinematography classes

at Scottsdale Community College's Film School. I stopped teaching at the community college last spring." ■ **Suzy Hodgson** writes: "My husband and I and my two boys, William, 10, and Nathan, 7, are moving from Surrey, United Kingdom, after 15 years there, to Charlotte, Vt. I will be taking my part-time job with me, carbon management for Carbon Clear, a U.K.-based company." shodgson@carbon-clear.com ■ **Joan Kelsch** writes: "I coordinate the green building programs in Arlington County, Va., and also am working on a new climate initiative. We work with private developers who build office and multifamily residential projects to get them to reduce the environmental impacts of their projects. I also chair a regional committee that is focused on standardizing green-building requirements for the entire D.C. area. My husband, **Tom Kelsch '90**, is the director of conservation programs for the National Fish and Wildlife Foundation. Our two boys, 10 and 7, keep us hopping with their various activities." ■ **Kristin Ramstad** writes: "I'm an urban forester with the Oregon Department of Forestry. I participated in the governor's incident management team in December, assessing the damage to both urban and rural forests in Northwest Oregon following devastating storms and flooding. Several cities along Oregon's north coast lost hundreds of mature conifers and have few resources to deal with the cleanup and replanting. Trees in inland cities suffered the effects of flooding, erosion and landslides. I presented a technical session on the need to increase awareness of local and national forestry issues among urbanites at the National Society of American Foresters convention in Portland in September. Leo, 9, Henry, 4, and husband, Alan, are doing well." ■ **Alexandra Teitz** writes: "I have a daughter, Cecily Claire Brooks, born in November 2006, and she is absolutely, totally wonderful. I'm working on climate, air pollution and other environmental issues for California Congressman Henry Waxman on the House Oversight and Government Reform Committee staff."

1992

Class Secretary
Katherine Kearse Farhadian
farhadian@verizon.net

Gary Tabor writes: "I left the Wildlife Conservation Society at the end of July to pursue new opportunities in conservation. At the WCS, we helped build the organizational and development capacity of the North America Program, catalyzed the strategic vision for species and landscape conservation in the wilds of Canada and the United States, established a climate-change adaptation effort, enhanced our work on wildlife corridor conservation and improved our engagement in policy and science communication. Over $1 million, representing 20 percent of the program's budget, was raised to help the North America Program become more visible and strategic in the ever-changing landscape of North American conservation. I'm looking forward to spending more time with my newborn son, Samuel." ■ **Mary Verner** became the 43rd mayor of Spokane, Wash., on November 27. She had previously served as city councilwoman.

1993 *15th Reunion Year*

Class Secretaries
Dean Gibson
deang@duke.edu

Molly Goodyear
bvidogs@cox.net

Heather Merbs
h.merbs@comcast.net

Susan Helms Daley writes: "My husband and I adopted our son, Jackson, 3, from Kazakhstan. I also gave birth to Emeline, 2. I squeezed in a trip to Idaho in October with **Margaret Williams** and **Ann Tartre** for a birthday party for **Molly Frantz '92**. It was so great!" ■ **Arjun Heimsath** writes that he is working at the new School of Earth and Space Exploration.

1994

Class Secretaries
Jane Calvin
jcalvin@prospeed.net

Cynthia W. Henshaw
chenshaw@eqit.org

Jane Whitehill
janewhitehill@hotmail.com

The National Wildlife Federation has named Common Ground High School, which was founded and is directed by **Oliver Barton**, as the winner of its 2008 National Conservation Achievement Award. Common Ground, one of a dozen national winners, received the award in the education category. The "Connie Awards" recognize outstanding contributions to wildlife preservation and habitat restoration, and are given to individuals and organizations nominated from across the country. Common Ground High School, located in New Haven, is Connecticut's only charter school focused on the environment. Students contribute to the operation of Common Ground's urban farm and environmental education center. Raising plants and animals, studying neighborhood, social and environmental issues, and investigating the environment are part of the academic curriculum. ■ **Thomas Brendler** writes: "Lucy and I and our 3-year-old, Phoebe Lee, welcomed little Violet Ballou into the world on August 15, weighing in at 7 lbs., 15 oz. In October, I became a founding member of the Rhode Island Environmental Justice League." ■ **Beth Conover** writes: "I have launched Headwaters Consulting, a sustainability strategies practice that began operating in November. My recent experience developing and implementing the Greenprint Denver program for Mayor John Hickenlooper was built on two decades of environmental innovation. For the last several years, I have been engaged in leading-edge local, national and international green business practices and have repeatedly helped to translate ideas into action. I am looking forward to the opportunity to continue working with public and private entities on realizing their sustainability goals." ■ **Javier Dominguez** writes: "I saw **Joaquín Leguia Orezzoli** and **Cesar Moran '95**, and spoke with **Cesar Flores '95**. We went to Joaquin's wedding in Mancora, on Peru's north coast. To see the photo, visit http://forestry.yale.edu/, go to

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

class notes

"Alumni/ae," then to "Class Pages and Photos." ■ **Mary (Jensen) Eddy** married Nils Eddy in September. They live in Salt Lake City, where Mary is an RN working on the burn trauma ICU at the University of Utah hospital. That hospital serves as the regional burn trauma center for the intermountain West (five states). Mary also reports that good pals **Evie Witten '95** and **Randy Hagenstein '84** came to Salt Lake City to delight in the consecutive winter storms that were blasting the Wasatch Range and providing for great skiing. ■ **Tad Gallion** says that his girls, Emma and Claire, 11 and 4, are thriving. His wife is a physician at Georgetown, and he's gainfully employed with the Senate Appropriations Committee. ■ Shirl and **Steve Harrington** traveled with family and friends to Tuscany and Venice. He's managing a small rural community center and continuing with sea-kayaking guide work. He recently stopped in to see **Thomas Brendler** and his expanding clan in Rhode Island. At the end of 2007, he got a publishing contract for his first novel. ■ **Jessica McGlyn** is working in the government relations department at World Wildlife Fund. ■ **Sean Murphy** is a senior regulatory specialist for Devine Tarbell and Associates in Portland, Maine. The firm's primary focus is on hydroelectric power, but most of his work has been in alternative energy (tidal, wave and wind power). He became engaged in December. His fiancée, Elizabeth, has a 9-year-old daughter, and they've had a lot of fun as a family. ■ **Tom Murray '95** and **Jenny (Bittinger)** are in D.C. She is at home with their two boys, Jay, 6, and Emmit, 4. Tom is the chief operating officer for the Edgar Lomax Company, a money management firm in northern Virginia. ■ **Joaquín Leguia Orezzoli** was married on a beach in northern Peru to Maria Luisa, a pediatrician. He also was nominated as a Young Global Leader for 2007 by the World Economic Forum and was among 250 young leaders below the age of 41 who were recognized. The selection committee was composed of the world's top media leaders and chaired by Her Majesty Queen Rania of Jordan. ■ **Guido Rahr** and Lee Lane are living in Portland, Ore. Life has been pretty crazy with three little boys and the Wild Salmon Center continuing to grow and flourish. ■ **Tanya Rubenstein** is the coordinator for the Three Mountain Alliance watershed partnership that is based out of Hawaii Volcanoes National Park. The partnership is made up of federal, state and private landowners, and they are working on habitat protection (fencing and feral animal control), reforestation (former ranch lands), environmental education and endangered-species restoration projects. The partnership recently expanded to include over 1 million acres on the island.

1995

Class Secretaries
Marie Gunning
mjgunning@aol.com

Ciara O'Connell
cmoconnell@comcast.net

Karalyn (Replogle) Colopy and her husband, Joe, welcomed newborn Xalvador McCurdy Colopy on October 28. He came into the world weighing 8 lbs., 1 oz. and was 21 inches long. ■ **Adam Moore** writes: "I am leaving the Connecticut Forest & Park Association in May to return to Martha's Vineyard. I will become the executive director of the Sheriff's Meadow Foundation, which is the private land trust for the island."

1996

Class Secretaries
Kathryn Pipkin
kate@goodisp.com

Julie Rothrock
jarothrock@verizon.net

Christina Cianfrani writes: "I am in the middle of my third year as an assistant professor in the School of Natural Science at Hampshire College, enjoying the freedom within the curriculum to teach a wide variety of water resources courses. The research collaborations of the Five College area in Amherst, Mass., also have been productive, and I am working on a number of projects relating to hydrology and ecology in small stream systems located in the area. My husband, Tom, and I welcomed our first baby. Mason Charles Cianfrani-Shin was born on December 21." ■ Last year, **Lis Grinspoon** married David Spiro, a pediatrician. In December, she gave birth to their son, Oliver Sheldon Spiro. Lis was on maternity leave from the Forest Service, where she's been working for more than five years. She has been the regional social scientist for Region 6 (Oregon, Washington and Northern California). She very much enjoyed her maternity leave, but returned to work in March. ■ **David Newman** writes: "Andrew was born on November 30, and his big brother, Ben, is happy and active. I am the director of sustainability for a Boston-based life science company, Millipore, working on issues such as product stewardship, renewable energy, green building design and energy efficiency." dartmouth91@yahoo.com ■ **Julie Rothrock** writes: "Our third daughter, Helen, was born in September 2006. We also moved to South Portland, Maine, last May, after almost 10 years in Boston. I'm a full-time stay-at-home mom, though I'm trying to do some consulting on the side as an ecological risk assessor with AMEC Earth and Environmental." ■ **Ted Schwartz** founded Apterra Technologies in 2007. The company develops remote monitoring and control systems for the wind power industry and manages turbines in the United States, Canada and Europe. Ted lives in Stow, Mass., with his wife, Julie, their 6-year-old son, Jack, 2-year-old twins, Ella and Sara, and dog Gretel. ted.schwartz@apterratech.com ■ **Ryan Valdez** writes: "I've accepted a Ph.D. research fellowship through the Smithsonian Institution and George Mason University, focusing on land-use and wildlife conservation research at the Mpala Research Centre in northern Kenya. My partner, Rob, and I have purchased a condo at the new Yale Lofts in D.C. and continue to travel and enjoy life." http://mpala.org

1997

Class Secretary
Paul Calzada
paul.calz@gmail.com

Jose Argueta writes: "I reside in Pittsburgh and work at the University of Pittsburgh. My wife, Liza, and I have two children, ages 6 and 4. ■ **Paul Calzada** writes: "I am a staff assistant at the Conservation Law Foundation in Boston." ■ **Namrita Kapur** is the chief operating officer for Root Capital, which was awarded a 2008 Social Capitalist Award by *Fast Company* magazine for the third year in a row. This year's Social Capitalist Awards feature 45 nonprofits that use the tools of business to solve the world's most pressing social problems, including poor health care in developing nations, unequal education access, homelessness, unemployment and substance abuse, and that have demonstrated a consistent and unusually large impact on society. Root Capital is a social investment fund that provides affordable credit and financial education to grass-roots businesses—farmer cooperatives, handcraft producer associations and ecotourism enterprises—in the developing world. Launched in Mexico and Central America in 2006, the financial education program will be replicated in South America and Africa beginning in 2008. ■ **Madeline Kass** is an assistant professor of law at the Thomas Jefferson School of Law in San Diego. She also teaches at Seattle University as a visiting professor. Her twin boys, 8, are active and keep her busy. She continues to play soccer to keep in shape for controlling said boys. ■ **Jonathan Kohl** writes: "We moved back to Costa Rica in February 2006. We joined forces with Marisol's brother, Fernando, to buy the Mayorga family house from their dad. For a period of 10 months, we renovated, remodeled and built our side of the house using biophilic architecture. Our toddler, Dion, is talking and running during all waking hours, usually starting at 4:45 a.m. I've been focusing on park planning, affiliated with the World Heritage Centre of UNESCO; heritage interpretation training for parks; ecotourism consulting; and writing, both nonfiction and some fiction. I've written a full-length novella and I'm preparing a book on Arrayanes National Park, Argentina, a new paradigm in park planning." ■ **Linwood Pendleton, D.F.E.S.**, is a senior fellow, director of economic research and director of the Coastal Ocean Values Center at the Ocean Foundation. He also is an associate professor in the School of Public Health at the University of California, Los Angeles, and is the lead nonmarket economist at the National Ocean Economics Program. ■ **José Juan Terrasa-Soler** is a lecturer and design critic in landscape architecture at the Polytechnic University of Puerto Rico in San Juan. He established his own environmental consulting, planning and design firm, *EnviroDesign Studio*. José Juan received license 39 to practice landscape architecture in Puerto Rico, and was recently welcomed into the "Colegio de Arquitectos y Arquitectos Paisajistas de Puerto Rico." He lives in San Juan with his wife, Alicia, and daughter, Sara Lauren. www.envirodesignstudio.com

1998 *10th Reunion Year*

Class Secretaries
Nadine Block
nadine.block@verizon.net

Claire Corcoran
corcoran_claire@verizon.net

John Burrows writes: "I got married in Augusta to my wonderful wife, Christy, who just opened her own psychotherapy practice here in Kennebunk. **George Berghorn** was in our wedding, and **Carlos Gonzalez '97, Ph.D. '03**, visited us earlier in the summer on a trip from Lima, Peru, with his wife, Heather, and baby Sebastian. I have been working for the Atlantic Salmon Federation for nearly eight years. ASF is an international nonprofit dedicated to conserving and restoring wild Atlantic salmon in New England and in eastern Canada. I have worked on numerous dam removal and river restoration projects, lobbied on dozens of pieces of environmental legislation and served on the ESA Recovery Team for endangered salmon populations. I helped create an innovative community and economic development program in Maine that ties river health and protection to community revitalization and investment. I have also been working on the groundbreaking Penobscot River Restoration Project, one of the nation's largest river restoration projects." www.penobscotriver.org ■ **Chris Elwell** writes: "My wife, Kirsty, and I celebrated the birth of our first child on January 18. Georgiana Dorrens Elwell weighed 7 lbs., 4.5 oz., and was 20 inches long. I am working for Timberland Investment Resources, and managing 190,000 acres of institutional timber investments in north Georgia and east Tennessee." cmelwell@yahoo.com ■ **Todd Forrest** is associate vice president of horticulture at the New York Botanical Gardens. ■ **Jessica Hamburger** writes: "After several years of work around the world on sustainable agriculture issues, I'm working close to home on California water issues. I spent a couple of years working on community-based watershed management at a local resource conservation district and, for the past year I've been working on water policy for the San Francisco Bay Conservation and Development Commission. We're participating in a long-range planning effort for the San Francisco Bay-Delta, trying to ensure that San Francisco Bay and its marshes get adequate flows of fresh water from the delta." ■ **Brad Kahn** and his wife, Erin, are expecting their first child this June, a boy. ■ **David Konisky** writes: "I completed my Ph.D. in political science from MIT in 2006, and I am an assistant professor at the Truman School of Public Affairs at the University of Missouri. My research focuses on the political economy of environmental enforcement and public attitudes toward the environment. I got married in July 2006 to Kristen Ellsworth. We love being back in the Midwest, and particularly enjoy hiking with our two Bernese Mountain Dogs, Jasmine and Ellie." ■ **Maria Rivera Maulucci** writes: "I completed my Ph.D. in science education at Teachers

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

class notes

College, Columbia University, in May 2005, and I am in my fourth year as an assistant professor of education at Barnard College. I teach Science in the City, which enrolls in-service and pre-service teachers. My husband and I have three children. My daughter, Anna, 4, and sons Anthony, 8, and John, 11, keep us busy." ■ **Nathan Smallwood** enjoys being a stay-at-home papa to two sons, 3 and 1. He writes: "In my 'spare' time, I provide strategy, marketing and development consulting services to arts nonprofits, and chair the board of the Warren County (Ohio) Arts Council."

1999

Class Secretaries
Jocelyn Forbush
jforbush@ttor.org
Jennifer Garrison Ross
jennifergarrisonross@yahoo.com
Christiana Jones
christiana@jonesfamilyfarms.com

Steve Bosak writes: "Mia and I have packed up the house and taken the three kids to New Zealand for the next couple years. I will be on a contract with the regional government agency, Environment Waikato, helping them build a coalition with the other New Zealand regional governments to promote and seek more support for their biodiversity protection efforts. We'll be living in Hamilton, which is about a 90-minute drive south of Auckland (on the north island). Our home is on the banks of New Zealand's longest river, the Waikato, which flows north from Lake Taupo and to the Tasman Sea." steven.bosak@ew.govt.nz ■ **Tom Dillon** writes: "I am the head of field programs for the World Wildlife Fund. We have hired a number of F&ES grads the past few years into my program, including **Caroline Simmonds** '06."

2000

Class Secretaries
Erika Schaub
easffe@hotmail.com
Zikun Yu
zikun.yu.for.2000@aya.yale.edu

Ali Abuyuan and husband Lindsay Monge welcomed their first child, Lucas Elliott, on January 8. Ali is a homemaker, but will begin part-time work again soon. She will be a climate-change consultant to Blue Advent Power, a Singaporean energy technology company that does business in Asia and the United States. The Abuyuan-Monge family is based in Carlsbad, Calif., which is in northern San Diego County. ■ **Colin Apse** moved to Portland, Maine, after a stint in New Paltz, N.Y., during its

short-lived "green" revolution. Colin is deputy director of The Nature Conservancy's Eastern Freshwater Program in Brunswick, Maine. Much of his work is focused on environmental flow protection, dam removal and riparian land protection in watersheds throughout the Northeast. ■ **Monica Araya, Ph.D. '06**, writes: "I have been working for Climate Change Capital, a boutique investment bank headquartered in London that finances renewable-energy projects and runs a carbon fund. I focus on projects in Spain and Latin America, and I am spending most of my time in Madrid, where I will move in the coming months. Because Spain is becoming a world leader in wind and solar-energy projects, it is exciting to be here. It has also been interesting to work for a U.K. bank and apply their know-how in a Spanish and Latin culture. It is a rare mix that I quite enjoy." ■ **Silvia Benitez** writes: "I am the conservation projects coordinator for The Nature Conservancy in Quito, but also working in Venezuela, Colombia and northern Peru. My work involves a lot of conservation planning, but I am also involved with environmental services. Alejandra is 12 and Sofia is 2." ■ **Eric Biber** is teaching environmental law at the University of California, Berkeley. He loves living in the Bay Area and hanging with all the F&ES alumni in the area, including **Berry Brosi**, **Matt Fladeland '01**, **Michael Stevenson** and **Yinlan Zhang '01**. ■ **Berry Brosi** completed his Ph.D. at Stanford last year and has continued there as a postdoctoral researcher. His research is on understanding how bee communities and pollination interactions respond to land use change and landscape structure, particularly in the tropics. Berry enjoys his busy travel schedule, climbing in the Sierras, playing his string instruments and babysitting Aiko Busby. ■ **Sylvia (Stone) Busby** was married in 2006 to high school friend Bruce Busby, and they have a beautiful baby girl named Aiko. Several F&ES friends attended their wedding last June, including **Berry Brosi**, **Anne Eschtruth**, **Bronson Griscom, Ph.D. '03**, **Heather Peckham Griscom, Ph.D. '04**, **Peter Kostishack**, **Caroline Kuebler** and **Laura (Dunleavy) Nelms**. Sylvia is conservation science and planning program manager at The Nature Conservancy in California, where she has been involved with the formation of a global network to increase the pace, scale and effectiveness of conservation in the world's Mediterranean biome. www.medconservation.net ■ **Linus Chen** writes: "I have one more year of law school to go at Emory, where I'm looking forward to participating in the Turner Environmental Law Clinic and seeing the public interest conference that I'm organizing become a reality. I was fortunate to receive an honorable mention from the Environmental Law Institute's student writing competition." ■ On June 2, 2007, **Ellen Clark** married in Washington, D.C. Many F&ES alums joined her to share her special day, including **Navis Bermudez**, **Eric Biber**, **Roberta Elias '01**, **Peter Hill '01**, **Matt Hollamby '01**, **Peter Kostishack**, **Caroline Kuebler**, **Laura Nelms**, and **Jim Woodworth '01** and **Kerry Cesareo '01** with their daughter, Celia Robin. ■ After six years working for Rare in D.C., **Maureen Cunningham** and her husband, Paul Miller, live in Sleepy Hollow, N.Y., where she is taking care of their son, Cole, 1, and doing part-time and consulting projects for Rare and other organizations. ■ **Anne Eschtruth** completed her Ph.D. at the University of California, Berkeley, and is a postdoctoral researcher. Her research focuses on how and why forests change over time, how these changes affect species distributions and dynamics and how best to apply this information to better manage forest systems over multiple spatial and temporal scales. Anne married college sweetheart David Doezema in 2005 at a wedding attended by **Berry Brosi**, **Sylvia (Stone) Busby**, **Jane Foster**, **Bronson Griscom, Ph.D. '03**, **Heather Peckham Griscom, Ph.D. '04**, **Caroline Kuebler**, **Erika Mark**, **Laura Nelms**, **Laura Pyle '03** and **Mariana Upmeyer Du Brul '01**. ■ **Heather Peckham Griscom, Ph.D. '04**, writes: "I am in my second year as an assistant professor of forest ecology at James Madison University in Harrisonburg, Va. We bought our first house a few months ago. Bronson has joined The Nature Conservancy's climate team in Arlington, working on projects to reduce carbon emissions from deforestation as part of a new forest carbon partnership facility with the World Bank." www.morphoblue.org ■ **Shannon Heyck-Williams** and her husband, Jeff, welcomed a daughter, Morgan Daly, into the world on December 19, 2006. Shannon works in the government affairs department of the Pew Environment Group (formerly the National Environmental Trust). ■ **Peter Kostishack** works for the Global Greengrants Fund, which provides small grants to grassroots environmental groups around the world. ■ In January 2007, **Caroline Kuebler** was recognized for five years of service at Conservation International, where she is the program manager for the Tropical Ecology, Assessment and Monitoring (TEAM) Network. She and **Peter Hill '01** live in the Capitol Hill area with their two dogs, Stanley and Scarlett. ■ **Chi-Hung "Charles" Liao** writes: "**Huei-An 'Ann' Chu** got her Ph.D. from the Department of Environmental Sciences and Engineering at the University of North Carolina-Chapel Hill in 2005. I am getting mine from the Department of Economics at the same university. We both have found teaching positions at California State University at Chico, and have moved from Chapel Hill to Chico. I'll be teaching in the Economics Department, and Ann will be teaching in the Geography and Geology Departments." ■ **Katie McArthur** writes: "I have a multimedia compliance job with the state of Massachusetts. I'm looking forward to a trip to Greece with **Mary Nguyen**." ■ **Heather McGray** directs a project on vulnerability and adaptation to climate change at the World Resources Institute, which has involved collaboration with students and Professor Rob Bailis. She attended **Aurelia Micko** and Milosz Mogilnicki's wedding in Poland, after which she

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

went backpacking in the Tatra Mountains with **Sasha Silver '01**. ■ **Laura (Dunleavy) Nelms** was married last September. She lives in Washington, D.C., with her husband and their dog, Tuly. Laura is program manager of Forests for Watersheds & Wildlife at the American Forest Foundation. Her wedding showcased the dancing skills of **Navis Bermudez**, **Maureen Cunningham**, **Anne Eschtruth**, **Shannon Heyck-Williams**, **Peter Hill '01**, **Peter Kostishack**, **Caroline Kuebler**, **Heather Langford '01**, **Heather McGray**, **Aurelia Micko**, **Ellen (Clark) Sorensen** and **Christie Young**. ■ **Carlos Pineda** was married to his beloved Azita Ghafourpour on November 10. The honeymoon in Thailand was as magical as the wedding. Carlos is living in San Francisco and still learning to help start companies and make power from the wind. cpineda@aya.yale.edu ■ **Doug Pfeister** was married on Labor Day last year to college friend Rebekah Gross in Fort Tryon Park near his apartment in Upper Manhattan. In attendance were **Colin Apse**, **Navis Bermudez**, **Jason Patrick** and **Tracy Triplett '01**. Doug has been working in the field of renewable energy for the past few years and joined a wind energy developer, Bluewater Wind, last year. Bluewater Wind is focused on getting the first offshore wind project built in the United States. www.bluewaterwind.com ■ **Steve Rhee, Ph.D. '06**, has been working since last fall at the State Department through the AAAS Science and Technology Policy Fellowship Program. He deals with trade, labor and environment issues. steve.rhee@aya.yale.edu ■ **Erika Schaub** is the director of emergency management at Hofstra University. In 2006, she graduated with an M.A. in security studies from the Naval Postgraduate School in Monterey, Calif., married a firefighter, James Makarius, and bought a house in a perfect location, so both she and Jimmy can maintain their positions as captain and an assistant chief at their separate volunteer fire departments. **Caroline Mitten** attended the luau-style wedding on Memorial Day.

■ **Dylan Simonds** writes: "My partner, Dorlon Wood, and I had a baby boy, William Muir Hillman Simonds, on January 21, 2007. We are happily nestled into the heart of Mill Valley, Calif., where Will gets more than his fill of trees, streams, sun and salt air." ■ **Rebecca Turner** is entering her last year at Vermont Law School. She is a Calvers Intern at the Conservation Law Foundation in its Concord, N.H., office. Becky plans to take the bar in Massachusetts next year. ■ **Roger Williams** has been living in San Francisco for five years and is ensconced in the quickly evolving carbon market in the United States through his work as vice president of portfolio development at Blue Source. He also serves as chair of the Carbon Offset Providers Coalition. After a post-F&ES stint with Cantor Fitzgerald in New York City, Roger has been enjoying the outdoor offerings of the Bay Area with Laura Viggiano, his girlfriend for the past three years.

2001

Class Secretaries
Leigh Cash
lcash@jhsph.edu

Adam Chambers
achambers@aya.yale.edu

Jennifer Grimm
jennifergrimm@aya.yale.edu

Leigh Cash is working on her doctorate in environmental health at the Johns Hopkins Bloomberg School of Public Health. She has been awarded the first Department of Homeland Security Science, Technology, Engineering and Mathematics Fellowship from PACER, the school's National Center of Excellence for the Study of Preparedness and Catastrophic Event Response. She, James and the dogs (Tango and Fonzie) split time among Maryland, D.C. and Connecticut. The horse, Kishua, is living the retired life in Millwood, Va. ■ **Matthew Clark** and **Abby Sarmac** are enjoying their son, Rowan, 1. They're heading to the Philippines in May to introduce Rowan to his great-grandparents. Matt started in October as the executive director of the Johnson Creek Watershed Council in Portland, Ore. ■ **John Daly** and **Mark Urban, Ph.D. '06**, climbed and skied down Mount Saint Helens. Also, John enjoyed a week of camping along the Oregon coast last summer with his wife, Joy, and their son, Kieran, 2. They also stopped by Portland on the way home to visit with **Matt Clark** and **Abby Sarmac** and their son, Rowan. ■ **David Ellum, Ph.D. '07**, has moved his family out to Asheville, N.C., where he is assistant professor of sustainable forestry at Warren Wilson College. Townes is enjoying kindergarten, and baby sister Seija is 16 months old. Mona is working for an environmental engineering firm in Raleigh. ■ **Lianne Fisman** is living in Cambridge, Mass., with her husband, Todd Zickler, and their daughter, Rivka, 2. Lianne completed her Ph.D. in urban planning at MIT in April 2007 and works part time as a consultant at Abt Associates. ■ **Herrick Fox** and Jen and their 18-month-old daughter, Stella, reveled in another epic winter in Jackson, Wyo. He is revising the management plan on the Bridger-Teton National Forest. ■ **Margie Huang** writes: "I work for Associates in Rural Development and am living in East Timor." ■ **Stephanie Jones** and **Chris Binggeli '02** live in Switzerland, near Lucerne. On August 22, 2007, Sebastian Foster was born. Older sister Hanna, 2, is thrilled. Sebastian's middle name is a family surname, meaning forester. shjones@aya.yale.edu ■ **Aya (Hirata) Kimura** is an assistant professor at the University of Hawaii at Manoa in the Women's Studies Department. She received her Ph.D. in sociology from the University of Wisconsin, Madison, was a visiting scholar at Stanford for a year and went to Hawaii last summer. Aya's research focus is the intersection of food, environment and development, and she is working on a book manuscript based on her dissertation, which examined nutritional science and its role in structuring food systems in Indonesia. She has a son, Isato, 1. ■ **Pradeep Kurukulasuriya** is enjoying living in New York City and working with the United Nations

Development Programme. He recently bought his own place, and enjoyed a holiday in Sri Lanka. ■ **Jeff Luoma** is now garden and forest manager for North Country School/Camp Treetops in Lake Placid, N.Y. He is managing a four-acre organic garden, a sugarbush and around 250 acres of forest—all involving kids ages 8 to 16. His partner, Betsy, manages the farm animals and heads the riding program. www.nct.org ■ **Tracy (Scheffler) Melbihess** and her husband, Eric, moved from Albuquerque, N.M., to Boise, Idaho, in October. She gave birth to their son, Tyler, in late August. She is a stay-at-home mom and a contractor with the U.S. Fish and Wildlife Service, working on carnivore issues. ■ **Quint Newcomer, Ph.D. '07**, initiated a carbon offset program in the Monteverde-Gulf of Nicoya Biological Corridor in Costa Rica for the University of Georgia Costa Rica Campus and UGA's study-abroad students. Trees planted will establish a long-term research forest for UGA's Warnell School of Forestry and will also restore degraded habitat for the resplendent quetzal and three-wattled bellbird. Quint and his wife, Lori, are building a house in Athens, Ga. ■ **Chris Nyce** is moving to Nicaragua for his second tour as a Foreign Service Officer. He will be with his wife, Rukmini, and two daughters, Rasa and Priya, in Managua from August 2008 to 2010. cnyce@hotmail.com ■ **Michel Ohly** had her first child, Miles Gibson Ohly, on April 20, 2007. Her husband is working at creating a custom bra company; keep a look out for Zyrra. Michel gets together with **Ellie Stewart Baker, Allison Willcox Guinan** and **Kim Ziegelmayer** once a month or so. ■ **Melissa Slotnick** completed her Ph.D. in environmental health sciences at the University of Michigan in August 2007. Her husband, Tim, and she reside in Ann Arbor, where she takes care of her 2-year-old son and conducts research related to exposure assessment and cancer epidemiology.

2002

Class Secretaries
Catherine Bottrill
cbottrill@hotmail.com

Roberto J. Frau
rfrau@aya.yale.edu

Mahua Acharya moved to London in December to join ArcelorMittal, to manage the company's participation in carbon markets and help develop a corporate response to climate change. ■ **Marin Altman** reports that she is pregnant with her second child. ■ **Viviana Araneda** was appointed trade commissioner in Los Angeles in July 2006 by the president of Chile. She has been living with her husband in California since October 2006. One of Viviana's most important motivations is to activate a cooperation agreement between Chile and California, signed in 1963 and originally oriented to agricultural cooperation. ■ **Catherine Bottrill** is excited to have **Mahua Acharya** in the London area. Catherine is examining sustainable energy lifestyles for her Ph.D. at Surrey University. Recently, she has been examining carbon management issues for the U.K. music industry on behalf of an industry group called Julie's Bicycle. ■ **Cintra (Agee) Cady** is in her second year as a Ph.D. student at F&ES, working with the Nuu-chah-nulth First Nations on Vancouver Island. She hasn't begun formal fieldwork yet, but her dissertation topic will discuss the "religious ecology" of natural resource management by First Nations, traditionally and today. ■ **Sarah Canham** writes: "I'm in Jackson, Wyo., skiing and doing some temp GIS work for the Bridger-Teton National Forest." ■ **Beth Cullen** is president of the Washington State Lakes Protection Association, which is working on state lake legislation, and hopes to ban phosphorus from lawn fertilizer by March. Otherwise, she is working on toxic algae and invasive weeds, living summers on boats and snorkeling in lakes. ■ **P.J. Deschenes** is heading back to Connecticut this summer to start a job with G.E. Energy Financial Services, after finishing his M.B.A. this spring. ■ **Rachel Fertik** is working for the Environmental Protection Agency, trying to keep the Clean Water Act from shriveling like a polar ice cap. In August, she and **Colleen Ryan** went for a weeklong sea-kayaking excursion in the Kenai Fjords National Park in Alaska. They discovered that drifting glacier chunks make good ice cubes for whiskey, and that rocks do not make a soft bed, no matter how round they are. They joined **Becky Tavani** and friends for New Year's week in New Hampshire, visiting **Carrie (Magee) Sargeant** and her new baby, Nicholas, in New Jersey and **Mark Ashton '85, Ph.D. '90**, in his little forest fiefdom. ■ **Rebekah Frederick** is associate director of philanthropy with The Nature Conservancy. She will be working on securing major gifts from individuals, corporations and foundations for TNC's $1.6 billion global campaign. ■ **Zhanna Beisembaeva-Funaro** and **Michael Funaro** are in New Haven. Michael is on an environmental team, working on GIS projects, at the Department of Health in New York City. Zhanna has her hands full with their two children, Danna and Kair. ■ **Kensuke Fuse** has been studying at Duke's Fuqua School of Business for an M.B.A. since August 2007. He writes: "This time I am a company-sponsored student, and my sleeping time is very limited due to the tons of group projects." ■ **Shalini Gupta** is a senior energy associate at the Izaak Walton League of America, a national conservation NGO. She has been appointed by the Governor of Minnesota to the state's Next Generation Energy Board, tasked with reviewing bioenergy policies for the state and region. **Matt Norton '96** and Shalini get a chance to work together a lot. Shalini and husband, Jim, had an amazing trip to India to tour remote places and see family. "**Gwen Busby, Laura Meadors, Nalini Rao** and I had a little reunion last summer at **Liz Levy**'s gorgeous wedding in the Berkshires," she writes. ■ **Nick Holland**, through Land Stewardship, is doing road and trail mapping for the Commonwealth of Massachusetts—over 800 miles in the last 18 months—rapid ecological site assessments and baseline documentation and monitoring of conservation easements for land trusts, conservation commissions and other conservation organizations. Nick recently joined **John (Judge) Potter** and **Mike DeBonis** in hiking some of

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

class notes

the "lost coast" in northern California. www.landstewardshipinc.com ■ **John Holman** has been working for U.S. Trust, Bank of America Private Wealth Management, in Manhattan since 2005. ■ **David Howlett** is doing his Ph.D. project in Spain on phosphorus retention and carbon sequestration in soils underlying silvopasture agroforestry. The University of Santiago has a managed experiment in Galicia with various applied biosolids. He is looking into the effect these treatments may have on local water quality and long-term carbon sequestration. David is there as a Fulbright scholar, on loan from the University of Florida, where he will return sometime this summer. He is very happy in a new relationship with a beautiful Brazilian doctoral student in Galicia. ■ **Shafqat Hussain** has recently been in the mountains of Pakistan following the annual winter migration of yaks of the Shimshali people (his "villagers"). He also collected snow leopard scat, which he brought back to the United States for DNA analysis to see if there is any genetic variation in the snow leopard population in Pakistan relative to the same species in the rest of the world. He is hoping to submit his thesis this spring and is looking for postdoctoral positions. ■ **Kendra Kinscherf** has passed the bar and is now an attorney. She says **Neal Etre** is now a senior associate at IEc. ■ **Nancy Kong** has moved from EcoSecurities' headquarters in Oxford to its New York City office, where she is in-house legal counsel. She deals mainly with the voluntary carbon market in the United States and project investment work in China, Southeast Asia and South America. ■ **Robin Kriesberg** is executive director of Friends of the Bay in Oyster Bay, N.Y., whose mission is to preserve, protect and restore the ecological integrity and productivity of the Oyster Bay/Cold Spring Harbor estuary and the surrounding watershed. It is the site of one of the most economically important shellfisheries in the state, annually harvesting up to 90 percent of New York's oyster crop. ■ **John Longstreth** successfully started up the Audubon Center in Southbury, Conn., and stayed there for about six years. Then Carolyn and John moved back to California after 30-plus years in the East and settled in Inverness. It is a little village in west Marin County, about 25 miles northwest of San Francisco, but about one hour by car because of the winding roads. The village is fronted on the east by Tomales Bay, which they overlook, and elsewhere by Point Reyes National Seashore. John volunteers at Point Reyes, PRBO and other enviro/birding-related organizations. They are slowly building a native plant garden. No lawn! ■ **Marty Mador** worked with Steve Kellert for the past few years on green building and biophilic design issues. They hosted a conference on biophilic architectural design in May 2006. Their book, *Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life* (Wiley, 2008), edited by Steve, Judi Heerwagen and Marty, became available early this year. It is the first comprehensive book to examine architecture and the innate human need to connect with the natural world (biophilia) from the various perspectives of academics, psychologists, journalists, designers, architects and developers. Marty is now spending some time as the legislative and political chair of Connecticut Sierra. Their most interesting bill is one that prohibits any restrictions on the use of clotheslines, which most condo associations prohibit. Marty will be working with the newly elected mayor of Bridgeport, formerly the Senate chair of the state environment committee, to study the feasibility of building Marty's museum of water and human civilization there. ■ **Nalini Rao** has finished her Ph.D. at Cornell and is a senior research fellow at Conservation International in Arlington, Va. ■ **Heather Richards** is director of land conservation for the Piedmont Environmental Council. Before that, she was the director of headwaters conservation for Potomac Conservancy in Winchester, Va., where she oversaw all land protection projects and guided strategy for the Shenandoah program and projects in the headwaters region of the Potomac River watershed. Heather was also responsible for the stewardship and monitoring of all Potomac Conservancy conservation easements. She and her husband, Kevin, live in historic Winchester. ■ **Justin Ruben** is organizing director at MoveOn.org, where he oversees campaigns. This year he will be working to help pass progressive legislation on climate change and health care, among others. Last summer, after an epic hike of the John Muir Trail, he married Autumn Leonard in the Berkshires. They live in Austin, Texas, where Autumn is in film school. He spends as much time as he can in the Barton Creek Greenbelt with their two dogs. ■ **Carrie (Magee) Sargeant** had a son, Nicholas, on September 26, 2006. She and her husband, Anderson, took Nicholas to Barbados in December to meet family and had a great time. **Sarah Canham**, **Becky Tavani**, **Rachel Fertik** and **Colleen Ryan** came by the house for a Christmas dinner. Carrie is environmental director for the Heart of Camden in New Jersey. ■ **Kim Thurlow** and **Marc Stern**, **Ph.D.** '06, are expecting their second child in June 2008. Kim is going on maternity leave after five years with TNC. Marc is busy teaching in the Department of Forestry at Virginia Tech. He's teaching environmental interpretation this spring and environmental education and social science research methods in the fall. He also has a number of ongoing research projects with the U.S. Forest Service and the Audubon Society, studying the human dimensions of natural resource management. ■ **Sarah Wakefield** is living in New York City, managing publications for the Earth Institute at Columbia University. Until January, she was working for The Nature Conservancy in Vermont; she enjoyed the chance to live in the Green Mountains, where she grew up. ■ **Paul Walberg** got married in August 2006 to Serena Connolly, whom he met at Yale. He has been the project director for an international partnership called Online Access to Research in the Environment. He finds visiting the countries and people that benefit from the partnership's

efforts the most rewarding part of his work.

2003 *5th Reunion Year*

Class Secretaries
Brian Goldberg
brian.goldberg@aya.yale.edu

Scott Threadgill
michael.threadgill@aya.yale.edu

Elizabeth Allison is in Bhutan working on dissertation research on religion and the environment. **Eric Biber '01** got to visit when he had a short consulting gig there with the National Environment Commission. ■ **Rebecca (Ashley) Asare** had a girl, Claire Adjoa Asabea Asare, on November 19. Mother and daughter spent the holidays in Vermont before returning to Ghana in the new year. To see the photo, visit http://forestry.yale.edu/, go to "Alumni/ae," then to "Class Pages and Photos." ■ **Charles Brunton** writes: "I work at NatureServe in Arlington, Va., on leading user needs and interacting with key audiences." ■ **Andy Clack** is well into his second year of Ph.D. work at McMaster University's Ancient DNA Centre in Hamilton, Ontario. His main project is titled "Estimating Lineage Split Dates Within the Extinct West Indian Megalonychid Sloths, via Ancient DNA With Applications Toward Understanding the Historical Biogeography of the Insular Neotropics." ■ **Daniella Cusack** is working on her Ph.D. at the University of California, Berkeley, in the Department of Environmental Science, Policy and Management, and looking to finish by December 2008. She's looking at the effects of pollution on carbon storage in tropical forests. ■ **Melanie Cutler** is expecting a second baby in March. Emmy turned 2 in February. Mark is teaching Spanish and running the outdoor adventure programs at Phillips Academy. Melanie has been teaching environmental science and biology at Andover High School. This year she rekindled the Environmental Club and advised a great group of interested students. ■ **Brian Goldberg** writes: "I'm immersed in the challenge of planning, designing and constructing a new public park in Coney Island." ■ **Bishop Grewell** writes: "After a yearlong clerkship in Denver, Colo., where I bumped into **Ted Lanzano** on the street, I've returned to Chicago to work for the law firm of Mayer Brown. I am doing appellate work and enjoying the town." ■ **Kate Hammond** is in Washington, D.C., finishing the second year of her two-year legislative affairs fellowship with the National Park Service. She and her husband, Geoff, had a baby girl, Avery, in November. ■ **Ben Hodgdon** and **Margarita Fernandez '04** are living in Oaxaca, Mexico. ■ **Orawan Intarakomalyasut** writes: "I am working with ExxonMobil in Thailand. I am expecting my second baby, a boy, in April." ■ **Krithi Karanth** is raising a terrific 9-month-old and finishing her doctoral dissertation. She expects to graduate this fall. ■ **Takatsugu Kobayashi** got married and is in Indiana. ■ **Flo Miller** married **Bill Finnegan** in September. They are living in Vermont. ■ **Bryan Petit** writes: "I am part of the Forest Service's Office of Budget and Program Analysis, reviewing programs and policy for the Secretary of Agriculture." ■ **Liz Roberts** learned how to cross-country ski and skate ski and is doing a second ski tour of Anchorage to raise money for the Leukemia Lymphoma Society. ■ **Laura Ruiz** writes: "I'm a biology teacher at the Math and Science School on the California State University, Los Angeles, campus. Last year I took a group of students from East L.A. to study ecology on Santa Cruz Island for a week. Last summer, I got married and am now expecting a daughter in May." ■ **Abdallah Shah** writes: "I am a technical advisor for a wetland conservation project. My main role is to advise on the management planning development process." ■ **Emily Sprowls** and her husband, Dave, moved to Bloomington, Ind., last fall. She is teaching all the sciences at a small independent school with a democratic and environmental mission. Emily teaches alternative curricula, focusing on student involvement and project-based learning, at the high school level. ■ **Laura Tam** is the sustainable development policy director at San Francisco Planning & Urban Research, a public policy think tank. She's working on green infrastructure issues—including energy, water, wastewater and green buildings—and helping San Francisco mitigate and prepare for climate change. Darryl and Laura were expecting their first baby on February 5. ■ **Nicole Vickey** writes: "Jesse, Elle and I moved to Orlando, Fla., in July 2007 to be closer to Jesse's family. I'm with The Nature Conservancy, working on increasing its public funding for Florida conservation projects. Elle is 3, so we spend a lot of time at Disney." ■ **Jason Wilmot** lives in Jackson, Wyo., with his wife, Kate, his daughter, Sydney, 3, and his son, Luke, 1. When not searching for wolverines in Yellowstone, he directs the Northern Rockies Conservation Cooperative.

2004

Class Secretaries
Jennifer Vogel Bass
jennifer_vogel@yahoo.com

Keith Bisson
keith_bisson@yahoo.com

Daniela Vizcaino
Daniela.vizcaino@aya.yale.edu

Laura Wooley
le.wooley@gmail.com

Jessie Barnes writes: "I am in Egypt, carrying out the fieldwork for my Ph.D. research in water management in agriculture." ■ **Keith Bisson** writes: "**Beth Owen** and I got married at Maine Audubon in May." ■ **Cherelle Blazer** is head of environmental projects at a green development company, EverGreen Land. She writes: "The purpose of EverGreen is to connect people with nature by establishing residential communities in natural surroundings built with state-of-the-art green technology." ■ **Laura Bozzi** writes: "This will be my first year as a Ph.D. student at Duke's Nicholas School. I plan to focus on climate-change policy." ■ **Kyla Dahlin** writes: "I'm living in San Francisco and starting a Ph.D. in biology at Stanford, where I'll be studying remote sensing, landscape ecology and climate change." ■ **Sarah Davidson** writes: "I'm at

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

class notes

WWF in Washington, D.C., with their Macroeconomics Program Office. I saw **Robin Barr, Jen Vogel Bass, Melissa Aikens '04, Corrina Steward '04** and **Kim Mortimer '04** for a minireunion in Tennessee's Smoky Mountains." ■ **Michela De Palo** lives in London and works for Climate Change Capital. **Austin Zeiderman '05** and Page visited at the beginning of the month.

■ **Tasha Eichenseher** writes: "I'm doing editorial research for the National Geographic Channel in Hong Kong." ■ **Alissa Hamilton** was awarded a two-year fellowship by the Food & Society Policy Fellows Program, funded by the W.K. Kellogg Foundation, Fair Food Foundation and Woodcock Foundation. She is a writer, lawyer and research fellow at the University of Toronto in Ontario.

■ **Betony Jones** is director of program development for the Sierra Business Council in Truckee, Calif. She's delving into a lot of interesting areas of conservation finance, markets for ecosystem services, relocalizing rural economies and carbon trading.

■ **Heather Kaplan** is a senior policy analyst on climate change at Oxfam America and is based in Boston. She is working on domestic and international climate policy as it relates to the impacts of climate change on the world's poor. She is also getting married in July in Yosemite National Park and plans to toast John Muir on her wedding day. ■ **Cindy Kushner** is in East Timor, advising on rural water and sanitation and community development. She plans to head back to the States later this year and is excited about living with an uninterrupted power supply. ■ **Rosemarie Mannik** writes: "I've been living in Melbourne, Australia, for the past year and a half and loving it. I'm working in the environmental division of Sinclair Knight Merz, an engineering consulting firm." ■ **Megan Mattox** writes: "I moved to New Zealand in March after a year and a half in Sydney, Australia. I work for Hancock Natural Resource Group in timberland investment management in Australasia." megmattox@hotmail.com

■ **Liz (Wyman) Mills** writes: "I am a Ph.D. student in environmental history at the University of Wisconsin, Madison, where I am working with Professor Bill Cronon. Last summer, I completed my first solo traverse of the Presidential Range in New Hampshire's White Mountains."

■ **Kim Mortimer** writes: "I am a wildlife biologist for the Florida Fish and Wildlife Conservation Commission, working on private lands conservation, which has proved to be an important and difficult arena in this development-dominated state. I'm doing as much art as possible, and I even have access to a local studio."

■ **Christopher Riely** returned to New England last fall and is a forester in the region. ■ **Nalin Sahni** writes: "I'm in my second year of law school at the University of Toronto. I'm probably doing an exchange to the Netherlands or Denmark on environmental law in the fall." ■ **Daniela Vizcaino** is the Guayana Shield Corridor coordinator for Conservation International Venezuela. ■ **Kevin Woods** writes: "I remain in mainland Southeast Asia, currently in Chiang Mai, Thailand, working on regional hydropower and timber trade issues, with an eye cast toward Burma." ■ **Laura Wooley** writes: "I'm working for New York City Parks and Recreation. I'm busy coordinating the programs of the New York Tree Trust and conceiving of strategies and collaborations for inspiring more of this fine city's growing population to take ownership of our urban forest." le.wooley@gmail.com

2005

Class Secretaries

David Cherney
david.cherney@colorado.edu

Dora Cudjoe
dcudjoe@thegef.org

Virginia Lacy
virginia.lacy@aya.yale.edu

Benjamin Urquhart
bnurquhart@gmail.com

Lauren Baker is a program associate for the Human Rights and Environment and Law and Communities Programs at the Center for International Environmental Law in Washington, D.C. Lauren is also applying for J.D./Ph.D. programs this year, so she will probably be back in school in the fall. ■ **Kelly Coleman** is the program director for Community Involved in Sustaining Agriculture, a community-based nonprofit in western Massachusetts whose mission is to get farmers and community members to sustain agriculture. ■ **Cho-Yi Kwan** writes: "After two years of working in Boston, I moved to the greater D.C. metro area last July, and have been working within the U.S. Environmental Protection Agency Office of Solid Waste." choyikwan@aya.yale.edu ■ **Rob Lamb** writes: "Mary Alice and I are in western North Carolina with other F&ES grads **Megan Sutton** and **David Ellum '01, Ph.D. '07**, with whom I collaborate from time to time. I am in the midst of starting my own consulting forestry business, Forest Stewardship Services. Mary Alice and I have a son, Tennessee Proffitt Lamb, who is going on 2."

■ **Trent Malcolm** is an environmental consultant for URS in Oakland, Calif. He works primarily on regulatory issues related to endangered species and wetlands. ■ **Sarah Matheson** is a junior professional associate in the Corporate Environmental and Social Responsibility Program for the World Bank. ■ **Lisa Patel** started medical school at Johns Hopkins and will probably return to her environmental roots this summer, working on a project evaluating how environmental degradation affects the health of communities in the Peruvian Amazon.

■ **Kaisone Phengsopha** is undertaking his first year of Ph.D. studies at Melbourne University, Australia.

■ **Megan Sutton** and Andy Tait got engaged. Megan writes: "We will do our best to keep our wedding carbon-neutral, low-impact and ecofriendly. We hope to tie the knot sometime in 2008." ■ **Elena Traister** is teaching and coordinating the environmental studies program at the Massachusetts College of Liberal Arts. She is also working on her Ph.D. at the University of New Hampshire, focusing on the response of stream ecosystems to disturbance. ■ **Taishi Yusuke** is a knowledge management

manager at the Centre for Micro Finance in Chennai, India.

2006

Class Secretaries

Flora Chi
ying.chi@aya.yale.edu

Reilly Renshaw Dibner
reilly.dibner@aya.yale.edu

Susan Ely
sue@akcenter.org

Krista A. Mostoller
anderson_kb@yahoo.com

Jill Savery
jillsavery@yahoo.com

Jessica Albietz writes: "For the past year and a half, I have been working on watershed restoration in the Feather River watershed in the northern Sierras of California. My job entails surveying, designing and monitoring meadow and stream restoration projects, using a technique called 'pond and plug.' I am constantly learning more about engineering and implementing restoration projects to restore eroded channels from decades of land abuse to productive meadow ecosystems in the headwaters of the state of California." ■ **Dada Bacudo** is a resource mobilization advisor for Uganda Environmental Protection Forum—a small NGO in Kampala, Uganda (East Africa), under the Volunteer Service Overseas program. He is working to secure funding and is developing proposals for a full range of projects that deal with waste management, agroforestry and energy efficiency." ■ **Saima Baig** is an environmental economist who runs a consultancy for the Sri Lanka chapter of the Geneva-based International Union for the Conservation of Nature. She is based in Karachi. She appeared on the BBC to answer questions about life in Pakistan in 2007. ■ **Jeanne Braha** writes: "I had a baby, Daniel Harry Troy, and he is a regular conversationalist and a skilled thumb-sucker." ■ **Mohamad Chakaki** writes: "I'm consulting independently through a D.C.- and Dubai-based group called Baraka Consulting. They're incubating my business idea, which I'm generally referring to as social ecology problem solving. This includes place-based education, green design, smart growth and sustainable development. Some friends of mine and I are adding a Muslim voice to the growing faith-based environmental movement." http://dcgreenmuslims.blogspot.com/ ■ **Flora Chi** writes: "Gung Hay Fat Choy—Greetings from Hong Kong. Besides doing my job and business travels, I go sailing and windsurfing on weekends." ■ **Joel Creswell** writes: "I'm in the second year of a doctoral program in environmental chemistry at the University of Wisconsin, Madison, studying mercury biogeochemistry in wetlands. My research takes me to some of the more remote (and beautiful) parts of the upper Middle West, where I plunge most of my body into mud and spend the rest of the day smelling like sulfur." ■ **Reilly Dibner** writes: "I raced Ironman New Zealand again in March. Since finishing my Fulbright year in Ireland, I've been interning for the NASA Astrobiology Institute in California and working for my old enviro firm, often sorting large piles of paper. This summer I'll head back to Ireland to continue frog research with the Irish National Parks and Wildlife Service and possibly begin a Ph.D. in Galway." reillydibner@gmail.com ■ **Diana Dimitrova** writes: "Last summer I moved to Norman, Okla., to join my husband, who is soon to finish his M.B.A. I started working in Oklahoma City at Trinity Consultants, an environmental consulting company specializing in air pollution modeling, compliance support and emissions inventorying." ■ **Kostis Drakonakis** and his wife, Joy, are living in New Haven—he's working at the Clean Energy Fund and was promoted last year to manager of new technology investments. He also received his professional engineering license." ■ **Sue Ely** writes: "I started a job with the Alaska Conservation Alliance and Alaska Conservation Voters in Juneau. I coordinate a statewide grass-roots effort to pass conservation legislation and I produce communications materials." ■ **Alicia Gray** writes: "I am a program manager of impact assessment for the Aquaya Institute in San Francisco. The Aquaya Institute is a research and consulting nonprofit that combats waterborne diseases in the developing world. Most of my projects are in India, and I am traveling there frequently." ■ **Gonzolo Griebenow** writes: "I evaluate the environmental performance of developing countries as they relate to the bank's lending policies at the World Bank in D.C. I continue to give assistance to the Peruvian Ministry of Environment. With the support of professors at Columbia University, I am working on a proposal to study the main impacts of climate change on the tropical Andes." ■ **Jesse Grossman** writes: "I am living in New York City and continue to push the solar energy services model at Soltage." ■ **Emily Hicks** writes: "MaNoi (my Dalmatian) and I are moving to Colombo in February, where I'll be working at the U.S. Embassy for the next two years." ■ **Drena Howard** is working for United Technologies in Hartford. She works in environmental health and safety on a variety of issues, such as greenhouse gas reduction and ergonomic injuries. ■ **Wei-Chien Lai** married Wen-Hung Lien in January. She is a contract researcher with Taiwan's National Marine Park. In September, she visited Bhutan for eight days with **Jill Savery** and **Kim Wilkinson**. To see the photo, visit http://forestry.yale.edu/, go to "Alumni/ae," then to "Class Pages and Photos." ■ **Rita Lohani** writes: "I've been living in Bangkok for more than a year. I am an environmental specialist and a business development specialist for Tetra Tech, an environmental consulting firm based in the United States. I will still be based in Bangkok." ■ **Jennifer McKnight** writes: "I'm in D.C. with TNC, advocating for U.S. climate-change policy." ■ **Mary McNealy** writes: "I will be getting married in August 2008 in the Willamette Valley (Oregon's wine country)." ■ **Caren Mintz** writes: "I have been working at GreenOrder since graduation. We're a management consulting firm in New York City that helps companies with sustainability strategy, technical analysis and communications. I have become a

Visit the Yale School of Forestry & Environmental Studies website at environment.yale.edu

class notes

blackberry-toting, city-loving environmentalist. My favorite project so far has been helping with the development and implementation of Climate Counts, a nonprofit started by Gary Hirshberg of Stonyfield Farm and Clean Air-Cool Planet. The project rates how companies are addressing the issue of climate change. I also took a vacation in Egypt." ■ **Daniel Piotto** writes: "I am a doctoral student at F&ES and the Lewis B. Cullman Fellow at the New York Botanical Garden." ■ **Anil Pokhrel** writes: "My wife, Manisha, our daughter, Anushka, and I have been living in Kathmandu since we left New Haven. I am engaged in climate adaptation work, and it involves traveling all over India, Nepal and parts of Pakistan." ■ **Tiffany McCormick Potter** is a senior analyst for Point Carbon. She writes: "I bought a small row house on Capitol Hill within walking distance to my job at Point Carbon, a Norwegian company that models fuel prices, weather and political risk to help companies break their addiction to fossil fuels." ■ **Alexis Ringwald** writes: "I am living in India and finishing my Fulbright Scholarship research on clean-energy trends, especially in investment and financing, based at Tata Energy Research Institute. I am working with Dr. Pachauri, chair of the U.N. International Panel on Climate Change." ■ **Patricia Ruby** writes: "My boyfriend, Will Bachmann, proposed on the cliffs of the Amalfi Coast, while we were traveling in Italy last fall. We haven't set a date yet, but I look forward to seeing some F&ESers on my big day." ■ **Jill Savery** writes: "I'm a sustainability consultant for PMC in Sacramento. I'm also helping to green the 2008 International Children's Games, which will take place in San Francisco in July." ■ **Catherine Schloegel** writes: "I work with Ecomadera, a community-run sustainable-forestry project, in Ecuador. We are working to slow deforestation of the tropical humid forest via the creation of a value-added wood products business. I am working with several local communities to create agroforestry and reforestation plots throughout the watershed." ■ **Maria Mercedes Seidler** writes: "I am a senior counsel with Dominion Resources in Richmond, Va. I am responsible for legal representation of its nonregulated energy trading and marketing business, which includes emissions and renewable energy credits. I am also working with its business group that is involved in the Regional Greenhouse Gas Initiative in New England and, in the near future, will work with its climate-change business group." ■ **Kim Wilkinson** writes: "Yale released my publication, *Other Voices, Other Ways—Better Practices: Bridging Local and Professional Environmental Knowledge*, available at http://environment.yale.edu/publications, and the Federal Highways Administration released *Roadside Revegetation: An Integrated Approach to Establishing Native Plants* (www.tfhrc.gov/pubrds/07nov/01.htm). Also, I'm engaged to Rahul Gupta, a Canadian family practice physician, and I'll be relocating to Vancouver, B.C." ■ **Dahvi Wilson** writes: "I am the director of sustainability for a neighborhood development being built in Victor, Idaho, on the border with Wyoming and Jackson Hole. My job involves a lot of things—marketing, newsletter writing, LEED certification and educational programs." ■ **Christina Zarrella** is the multistate conservation grant program coordinator for the Association of Fish and Wildlife Agencies in Washington, D.C. She works with the U.S. Fish and Wildlife Service to administer a $6-million-a-year grant program. In August, Christina moved to Williamstown, Mass. czarrella@fishwildlife.org ■ **Xizhou Zhou** writes: "I am focusing on emerging markets as an associate with Cambridge Energy Research. I'm based in Cambridge, Mass., but am enjoying my travels to client sites to discuss the most pressing issues in today's energy market. While in Beijing in November, I ran into **Marian Chertow, Ph.D. '00**, associate professor of industrial environmental management at F&ES, who was giving lectures on the circular economy, **Xue Wang '04**, a program officer at Conservation International, and **Han Shi '07**, who is completing his dissertation and consulting for an ecoindustrial park outside Beijing."

2007

Class Secretary
Rosi Kerr
rkerr@juice-inc.com

Anamaria Aristizabal writes: "At Ecovillage, we hosted 100 people in January for a national gathering of ecovillages and sustainable-alternative communities. I am very happy to be back in Bogota, surrounded by my family and old and new friends, and with the feeling of contributing to my country." ■ **Robin Barr** writes: "I'm a community forestry advisor for the Tropical Forest Trust's Southeast Asia programs. We help communities managing forests and agroforests become Forest Stewardship Council-certified. My job keeps me traveling between my base in Seattle and countries throughout Southeast Asia, though most of my time is spent on forest programs in Indonesia." ■ **Eliza Eubank** writes: "I am an assistant vice president of environmental and social risk management for Citigroup." ■ **Margarita Fernandez** has moved to Oaxaca, Mexico, after one year in Laos. She is a consultant for research institutes and local NGOs on sustainable agriculture and community development issues. She is also an inspector for certified organic farms throughout Mexico, mostly coffee grower groups. ■ **Fox Kral** writes: "I'm enjoying my job as an environmental consultant, working with companies on their climate strategy and carbon footprinting." ■ **Beth Moore** writes: "I'm in San Francisco working on greenhouse gas reduction policies for California. Turns out my F&ES classes have been incredibly relevant to my work here. I'll probably be back in New Haven next semester to help recruit some more students."

Frank Harris Armstrong '49 (1921-2007), a lieutenant colonel in the U.S. Army who won two awards for heroism and was wounded twice in a 28-year career, died on October 1 at the age of 86. Frank was a forestry professor at the University of Vermont for 25 years and a publisher since 1991. He enlisted in the 103rd Cavalry of the Pennsylvania National Guard in June 1939 and became an officer in 1942. He was an artillery forward observer and unit commander with the 283rd Field Artillery Battalion in the European theater, serving eight of the mainline divisions and receiving four campaign medals. He was with the 1st Cavalry Division in the initial days of the Korean War. His Korean War record included one award for heroism, six combat campaign medals and the Presidential Unit Citation. His military tours included three years with the U.S. Army in Germany, a year in Azerbaijan and a year as deputy district engineer of Okinawa and Taiwan. In the early 1960s, he had a three-year assignment as deputy professor of military science at Norwich University. He retired as a lieutenant colonel from the Army in 1966. After World War II, he received a B.A. from West Virginia University and a Ph.D. in forestry from Duke University in 1970. He also studied civil engineering at Texas A&M. *The Journal of Forestry* ran 12 of his publications, and he wrote and published books on his World War II battalion and the 1st Cavalry Division in Korea. He owned a corporation, Bull Run of Vermont, in Northfield, Vt., which sold books for veterans. In 2005, he moved to Albany, Ga., where he lived with his daughter, Allison. During the last six months of his life, he resided at Morningside Assisted Living. He was a member of the Northgate Presbyterian Church. He is survived by two daughters, Allison Largeman of Albany and Barb Evans of South Burlington, Vt.; a brother, Lt. Col. Herbert Armstrong (U.S. Army, retired) of Wayne, Penn.; four grandchildren; and two step-grandchildren. Marguerite, his wife of 47 years, and Suellen, a step-daughter, predeceased him.

Nedavia Bethlahmy '40 (1918-2007) died on September 21 at the age of 89. Born in Tel Aviv, Nedavia attended Simon Gratz High School in Philadelphia and held a B.S. from Penn State University and a Ph.D. from Cornell University. He served in the U.S. Army during World War II, was stationed in Tokyo and was promoted to captain before his service ended. After the war, he worked at the Forest Service's Boise Aquatic Sciences Lab in Idaho; the Northeastern Forest Experiment Station in Philadelphia; the Coconino National Forest in Flagstaff, Ariz.; the Allegheny National Forest in Warren, Penn.; and the Northeast Forest Experiment Station in Bethlehem, Penn. In 1960, he became the professor in charge of the Pacific Northwest Forest and Range Experiment Station. In 1966, he was project leader of the Intermountain Forest Experiment Station at Forestry Sciences Lab and, in 1970, became principal forest hydrologist for the Forest Service in Moscow, Idaho. He was the author of numerous research articles and papers. He is survived by his wife, Evelyn; a daughter; a son; and four grandchildren.

Wallace Deal Bowman '56 (1926-2007) was born in Jacksonville, Ill., and died on December 26 at his home in Falls Church, Va., after a heart attack at the age of 81. Wallace served in the Navy during World War II. In 1949, he graduated from Washington University in St. Louis, where he also received an M.A. in speech and hearing. Before settling in the Washington, D.C., area in the late 1960s, he was executive officer of the Conservation Foundation in New York. He joined the World Resources Institute shortly after it was founded in 1982 and served as its secretary-treasurer and as a conservation and environmental policy expert until he retired in 1993. He had been a policy specialist at the National Academy of Sciences and the Library of Congress, serving the latter as chief of the environmental and natural resources policy divisions. At the library, he also assisted U.S. Senator Henry "Scoop" Jackson with his sponsorship of the National Environmental Policy Act, which was signed into law by President Richard Nixon in 1970. He is survived by his wife, Kira, whom he married in 1961; two daughters, Ingrid of Santa Barbara, Calif., and Margaret of San Francisco; a son, Alexander of Vienna, Va.; and four granddaughters.

Melvin Chalfen '42 (1918-2007) died in Newton, Mass., on September 12 at the age of 89. Born in Boston, Melvin spent most of his childhood in Brookline, Mass. He graduated from Brookline High School and the University of Massachusetts. A lieutenant in the U.S. Army Air Corps, he served in Italy and North Africa. In 1951, he moved to Newton, where he was known and appreciated for his ongoing participation in community affairs and where he resided for the rest of his life. He was PTA president at Underwood School, ward chair of the Democratic City Committee, active in the civil rights and fair housing movements and a member of the committee that selected the architects to design the Newton Free Library. He spent his professional life as a forester in northern New England, a custom builder in eastern Massachusetts and a pioneer in the home-inspection business. A charter member of the American Society of Home Inspectors, he was committed to professionalizing the industry and raising it to the highest ethical and technical standards. In his leisure time, he concentrated on painting and music. He had played classical piano since childhood and studied art for more than 40 years, taking classes until June 2007 at the New Art Center in Newton. He is survived by his wife of

58 years, Judith; three sons, Robert of Cambridge, Mass., Daniel of Boulder, Colo., and Andrew of Philadelphia; and a grandson, Theodore of Boulder.

William Francis '53 (1926-2007) died on December 8 at Capital Medical Center in Olympia, Wash., at the age of 81. Born to John and Elizabeth Francis in Seattle, Wash., William lived in Olympia for 35 years. He served in the U.S. Army and did his undergraduate work at the University of Washington. He spent his professional career with Simpson Timber Company, retiring in 1986. He enjoyed gardening, growing vegetables, planting trees and mowing his lawn with a push mower. He and his wife, June, whom he married in 1951, took frequent day trips, and their favorite destination was Fort Clatsop, Ore. As an outdoorsman, he enjoyed all animals, hiking and observing wildflowers. He is remembered as an avid reader, especially of history books—he named one of his two dogs Lewis and the other Clark. He is survived by his wife, June, of Olympia; two daughters, Patti Wetzel of Tacoma, Wash., and Liz Farrar of Elma, Wash.; four grandchildren, Tyson and Taryn Farrar of Elma and Sophie and Anna Wetzel of Tacoma; and a brother, Jack, of Bellingham, Wash. He was predeceased by a sister, Joyce.

John Fryer '69, Ph.D. '82 (1940-2007), a native of Australia, died in Vietnam in mid-2007. John held a B.Sc.F. from the University of Sydney and a Dip.For. from the Australia Forestry School. He was a research scientist at the Department of the Capitol Territory in Canberra City in Australia. His family and a number of his colleagues in Australia and Vietnam have created the John Fryer Forestry Scholarship Fund in his honor. The fund will provide financial assistance for the education of forestry students at the postgraduate level in Vietnam. Family and colleagues say that he made many contributions to forestry and sustainable development in Vietnam and was eager to assist those seeking to improve their education. He is survived by his wife, Clare Cotterill, whom he married in 1965, and two sons, Tom and Mike.

William Haines '51 (1924-2007) died of leukemia on May 13 in Palm Desert, Calif., at the age of 83. William was born to Harry and Dana Haines in Somerville, N.J., and graduated from Elkhart High School in Indiana. He served in the U.S. Army from 1944 to 1946 and, after returning to civilian life, earned a B.A. from Oberlin College. He worked for the Forest Service in the Northern Rocky Mountain Forest Experiment Station and the Southeastern Forest Experiment Station in Georgia. In 1954, he participated in a forest survey of the coastal plain of North Carolina, and then worked in the Asheville office of the Southern Forest Experiment Station as an aerial photographer. When he retired in 1992, he began volunteering in his local emergency room and he traveled to Banff and Lake Louise in Canada and to Puerto Vallarta. He was involved in community theater and the Episcopal Church in Asheville, where he lived. In the spring of 1993, he traveled to Australia and New Zealand aboard a German freighter. He later moved to Palm Desert. He is survived by his partner, Harold Witherspoon.

Thomas Wesley Jones '49 (1921-2007) died on June 12 in New Bern, N.C. Thomas graduated from Roosevelt High School in Washington, D.C. He was married to Dorothy Evangeline Gramm in 1944 in Takoma, Md. He earned a B.S. from the University of Maryland in 1947 and, in 1949, joined the U.S. Department of Agriculture as a forest pathologist. He did research on oak in Missouri for the Forestry Department of the University of Missouri. In 1960, he served in the Forest Service at the Central States Forest Experiment Station in Delaware, Ohio.

Frank McCamey '41 (1919-2007) died on December 25 at the age of 88 in Decatur, Ga., of complications from a fall. For more than 40 years, Frank was a naturalist, university professor and nature center director. A native of Memphis, he obtained a Ph.D. in ornithology from the University of Connecticut, where he served as a professor of forestry and wildlife management from 1948 to 1962. He began his career researching and teaching with the Boy Scouts. He was a counselor and education assistant at the Boston Museum of Science and a ranger naturalist in Great Smoky Mountain State Park. He met his future wife, Virginia McCamey, while hiking in Connecticut. In the early 1970s, the late naturalist John Ripley Forbes recruited him to Georgia, where he helped establish nature centers throughout the state. Through his association with the Natural Science for Youth Foundation, he helped open the Elachee Nature Science Center in Gainesville, Chattahoochee Nature Center in Roswell, Reynolds Nature Preserve in Clayton County, Sandy Creek Nature Center in Athens and Atlanta Outdoor Nature Center. He was president of the Georgia Ornithological Society and treasurer of the Georgia Botanical Society. In 2005, he was awarded the Eugene Odom Outstanding Lifetime Service Award for his help in founding the Environmental Education Alliance and 29 nature centers. He is survived by his wife, Virginia; a daughter, Eleanor Lund; a sister, Helen McGoldrick of Honolulu; two grandchildren; and five great-grandchildren.

Bobby Neill '59 (1934-2007) died on November 7 at the age of 73 in Hot Springs, Ark., after a lengthy battle with leukemia. Bobby was born in Hope, Ark., to Lonnie and

Elsie Bolls Neill. He was a veteran of the U.S. Army, where he played in the 279th Army Band in France. He graduated from Louisiana Tech and, in 1966, founded and operated Neill Forestry Consultants. He was a member of the Society of American Foresters, Association of Consulting Foresters, Arkansas Forestry Association and Louisiana Forestry Association, and served as president of the Forest Landowners Association of Atlanta. He also served on the boards of the Arkansas Children's Hospital Foundation and Farmers Bank & Trust and as past president of the Magnolia Rotary Club. He was a longtime member of First Baptist Church in Magnolia, where he served as deacon. He is survived by his wife of 51 years, Laura Broom Neill of Magnolia, Ark.; two daughters, Traci Rowland of Magnolia and Stephanie Westerman of Hot Springs; five grandchildren, Trent and Garrett Rowland and Ashley, Brock and Kacey Westerman; a sister, Mary Hurst of Tyler, Texas; and a brother, Thomas of Magnolia. He was predeceased by an infant son.

William Nussbaumer '64 (1937-2007) of Knoxville, Tenn., died at the age of 70 on November 7. William was a retired forester who served 28 years with the Tennessee Valley Authority. He was a veteran of the U.S. Marine Corps. He held a degree in forestry from the University of Georgia, was a member of honorary fraternities Phi Kappa Phi and Sigma Pi and graduated with honors from the Yale School of Forestry. He was an avid outdoorsman and especially enjoyed his hikes to Mount LeConte. He is survived by his loving wife of 45 years, Rosa; three sons, Will of Flowering Branch, Ga., Phillip of Knoxville and Steve of Dallas; four grandchildren, Alexandra, Tyler, Virginia and Steven; and two stepgrandchildren, Dr. Justus Kam and Adrienne Kam.

Satellites

continued from page 37

Africa, where parks are big and understaffed. The device also will detect illegal loggers carrying chainsaws. Gulick will soon add acoustic sensors to pick up the sound of chainsaws and mechanized equipment, and an ultraviolet sensor to detect campfires.

Satellite technology has become crucial for managing resources and for planning. Experts are using satellite data to predict long-term weather patterns such as droughts and floods. This information improves management plans for natural disasters, agricultural programs and outbreaks of disease. Satellite sensors now can measure water volume in a river, regulate irrigation flows and detect the amount of moisture in soil. India's state-owned power utility is using satellite imagery to avoid putting transmission lines through forests. India and a few African countries are experimenting with telemedicine, which connects large hospitals to rural clinics via satellite. Satellites also make long-distance education possible. On a bigger scale, conservationists expect satellites to play a key role in the proposed initiative called REDD (Reducing Emissions From Deforestation and Degradation), in which developing countries could earn money by leaving their forests uncut. Satellites would monitor the program.

The technology is also revealing unexpected relationships. Scientists now believe that dust clouds blown from west Africa account for more than half of the Amazon's annual supply of minerals. These winds also carry industrial pollutants, bacteria and viruses that may cause diseases in this hemisphere, including asthma and flu in humans and foot-and-mouth disease in animals.

The potential of the technology seems boundless, but there are a few concerns, starting with access. Poor countries sometimes can't afford the necessary hardware and software or the fees for imagery and data. Developing countries may also lack people trained to use and interpret the technologies. Countries may refuse to share data, citing national security.

In the United States, scientists are concerned about neglect. Since 2000, the Bush administration has slashed the budget for Earth observation by more than 30 percent in real dollars, leading the National Academy of Sciences to warn in 2005: "The current U.S. civilian Earth observing system, operated by NASA, NOAA and the USGS [U.S. Geological Survey], is at risk of collapse," a warning that was repeated in 2007. Consequently, scientists anticipate a gap in the data stream provided by our workhorse Landsat system. Landsat 7, launched in 1999, has not been fully functional since 2003 and is expected to fail well before the next Landsat is launched in 2011 or 2012. The budget cuts also forced the delay or cancellation of many critical satellite missions related to Earth science, water science, sea surface temperatures, aerosols in the atmosphere, critical climate variables and others.

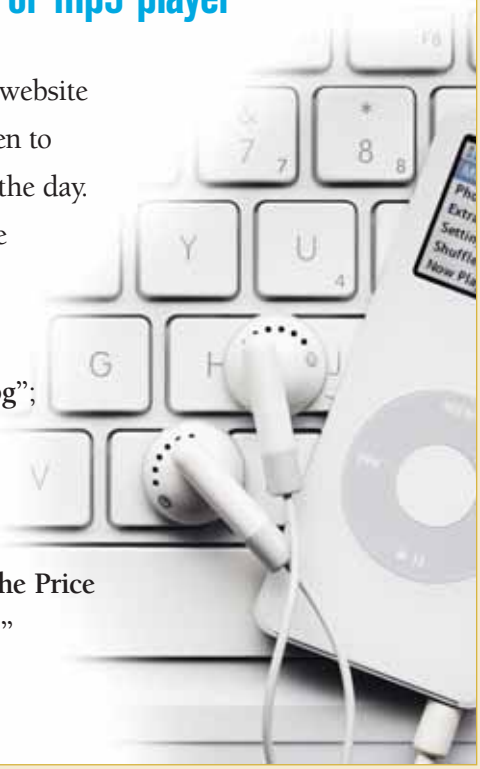
"We lost enormous capability at a time when we needed to be developing capability, particularly if we're trying to develop long-term records to understand long-term problems like climate change," says Berrien Moore, who co-chaired the National Academy report that contained the warning and is director of the Institute for the Study of Earth, Oceans, and Space at the University of New Hampshire. Moore is relieved that President Bush has proposed to raise the budget for Earth sciences by $100 million in fiscal year 2009, to $1.45 billion. But he also notes that this figure is still about $600 million less, when adjusted for inflation, than the government was devoting to Earth sciences in fiscal year 2000.

Scientists and NGOs have no doubt about the power of satellites to boost conservation. The question, says John Amos of SkyTruth, is whether satellite technology will keep up with the technologies that are having such a destructive impact on our planet. ■

Listen to the faculty of the Yale School of Forestry & Environmental Studies discuss their research on your desktop computer or mp3 player

Just go to iTunes and type in "Environment Yale" or to the school's website (http://environment.yale.edu) and click on the podcast icon, and listen to F&ES professors discuss the most pressing environmental issues of the day. At iTunes, you can subscribe to the series and have the next episode automatically downloaded for free when it is released.

The episodes in the F&ES series feature, to date, Dean Gus Speth, "**The Heart of the Matter**"; David Skelly, "**It's Not Easy Being a Frog**"; Stephen Kellert, "**Biophilic Design: Opening the Door to Nature**"; Dan Esty, "**Green to Gold**"; Oswald Schmitz, "**Global Warming and Species Distribution**"; Marian Chertow, "**Industrial Ecology: Why Waste *Waste*?**"; Robert Mendelsohn, "**Poor Countries to Pay the Price for Global Warming**"; and Lloyd Irland, "**Burn Trees, Save Energy.**"



Yale School of Forestry
& Environmental Studies

205 Prospect Street
New Haven, CT 06511 USA
tel: 203-432-5100
fax: 203-432-5942

address service requested