

THE JOURNAL OF THE School of Forestry & Environmental Studies

Environment Yale



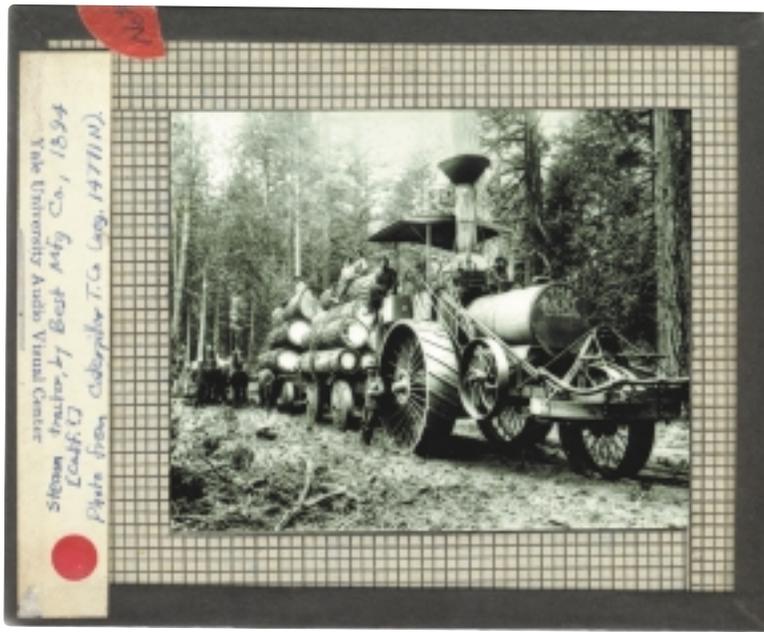
April 2002



Hidden Dangers

Pesticides, Diesel Exhaust
Threatening Public Health
*What You Can Do to Protect
Yourself and Your Children*

Inside: Major Initiative to Strengthen Forestry Program



Rare Images from Forestry's Past

A collection of 3,000 historic, forestry-related lantern slides—a legacy of classrooms of the past—are being digitized in a project led by the Global Institute for Sustainable Forestry (GISF). When completed, the collection will be uploaded to a searchable archive on the worldwide web where anyone with a computer can access and enjoy them. The project is roughly one-third complete with approximately 1,300 slides processed to date.

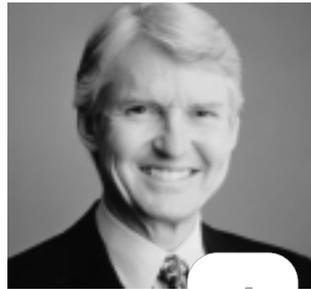
A complimentary CD is available by contacting Gary Dunning, executive director of the GISF, at: gary.dunning@yale.edu.



Environment Yale



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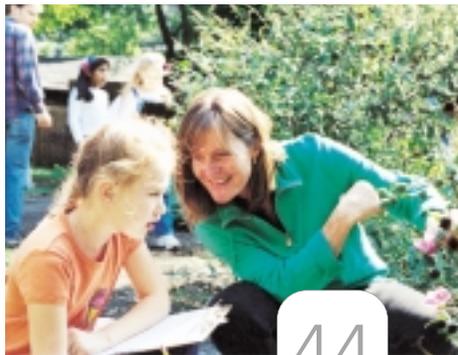
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Environment: Yale

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What you are holding is the inaugural issue of *Environment: Yale*, the new journal of the School of Forestry & Environmental Studies. We hope you like it, react to it, and let us know what you think. In this issue and future ones, our ultimate goal is to reaffirm the school's proud tradition, herald its leading role in forestry, and yet reflect its broader mission and aspirations to become a global school of the environment.

To symbolize the journal's new direction, the lead story focuses on key threats to children's environmental health. John Wargo, professor of environmental risk analysis and policy at F&ES, has spent more than a decade chronicling the threat of pesticides to public health and has spent the last year conducting a study on the presence of diesel exhaust in school buses for Environment and Human Health, Inc., a North Haven-based non-profit organization dedicated to protecting the public from environmental hazards. The report is eye opening. We can all readily agree that protecting our children—our future—from environmental harms should be a national priority.

Also inside, Chad Oliver, a renowned silviculturist, returns to F&ES to lead Yale's Global Institute for Sustainable Forestry; Yale-Myers Forest gets high marks for sustainable forestry practices based on international accrediting standards; and three women from China and Kenya share their diverse perspectives as members of the visiting faculty.

Finally, we acknowledge our supporters, many of them Yale alumni/ae, who are leading our \$60 million campaign which is more than halfway toward its goal. Through their generosity, they make all this good news possible.

James Gustave Speth
Dean

A group of us here at the School were asking ourselves in late September whether there could be silver linings on the dark clouds of September 11. Could anything hopeful or positive come out of this tragedy?

Of course, a sharp reduction in international terrorism would be one very positive thing. Terrorism has been on the international agenda for a long time, has lately been on the upswing, and has now reached our shores. September 11 has prompted a serious and overdue response.

But beyond this important point, what else? We actually developed a substantial list, and, now, a few months later, it is interesting to reflect on it and see if events have moved us in these hopeful directions, a number of which would help in the war against terrorism.

Here's the list. As you go through it, ask yourself, is this plausible or a pipe dream?

1. Reawakening U.S. engagement in international affairs. Will September 11 reverse the U.S. slide toward unilateralism and tuning out the rest of the world?

The U.S.' tendency to adopt a go-it-alone posture toward the rest of the world is not new. One hundred and ninety-one countries have ratified the Convention on the Rights of the Child. There must be at least 192 countries today, for the U.S. is not among the 191. Most countries have ratified the Convention on the Elimination of All Forms of Discrimination Against Women, 165 at last count, but Afghanistan and the U.S. have not. We join Afghanistan again, and also Libya in being among the few which have not ratified the Convention on Biological Diversity. Our partners in opposing the Land Mine Convention include Cuba, Sudan, North Korea and Libya. This list goes on, revealing a pattern of unilateralism and of not cooperating.

The Bush Administration was in the process of pushing this approach to new heights before September 11. In January 2001 it announced that it could not support the new treaty establishing an International Criminal Court; in March it abandoned the climate treaty's Kyoto Protocol; in May it said it would pull out of the 1972 Anti-Ballistic Missile treaty; it then threatened to withdraw from international conferences on racism and illegal trafficking in small arms; and in July it rejected a proposed enforcement measure for the Biological Weapons Convention. All of which prompted the *Economist* to note that, "After five treaties have been shot down in seven months, it is hard to avoid the suspicion that it is the very idea of multilateral cooperation that Mr. Bush objects to."

Success in the war on terrorism, and much more, will depend on international cooperation, and not just from OECD countries. The positive agenda here would be a shift in American foreign policy toward collaborative engagement and cooperation with the rest of the world. The United Kingdom and others have already expressed interest in seeing the U.S.' new multilateralism extend to agreement on climate change and the Kyoto Protocol.

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Hidden Dangers

Pesticides to Diesel Exhaust

Even before the threat of bioterrorism exposed the nation's vulnerable public health system, many environmental hazards permitted by the federal government and consumed by an unknowing citizenry have long endangered human health. More worrisome, those most vulnerable and most exposed are often our children.

Toxic chemicals, or pesticides, used widely in agriculture, homes and schools have permeated our daily lives, yet little is known about their long-term effects. And those familiar yellow school buses appear to be carrying both children and some of their worst enemies. Diesel exhaust, which is composed of cancer-causing substances, has been found to accumulate within buses as children ride to and from school.

John Wargo '84 Ph.D., professor of environmental risk analysis and policy at the Yale School of Forestry & Environmental Studies, has chronicled the environmental dangers faced by children for more than a decade. In his book, *Our Children's Toxic Legacy: How Science and Law Fail to Protect Us from Pesticides* (Yale University Press, 1998), Professor Wargo gives an overview of the history of pesticide use, our evolving knowledge of its effects, the role of the Environmental Protection Agency (EPA) and the huge and complex risk assessment problems the EPA faces. But more on that later.



John Wargo

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'No Known Safe Level of Exposure for Diesel Exhaust'

More recently, he has turned his attention to children's exposure to air pollution. Working with medical doctors, public health and policy experts that joined to form a non-profit organization, Environment and Human Health, Inc. (see sidebar page 17), Professor Wargo and his colleagues began to explore how individual children experience air pollution during their school days. The study, released at a news conference in Hartford on Feb. 7, spotlights this serious health risk for children, the dimensions of which are just coming into focus for the general public.

"Components of diesel exhaust are genotoxic (damages DNA), mutagenic (causes mutation), and can produce symptoms of allergy, including inflammation and irritation of the airways," Professor Wargo, the lead author, writes in the study, *Children's Exposure to Diesel Exhaust on School Buses*. "There is no known safe level of exposure to diesel exhaust for children, especially those with respiratory illness."

It is a disturbing statement considering the magnitude of the situation. In the United States 24 million students are transported each day to school by nearly 600,000 school buses, most of which are powered by diesel fuel. In Connecticut, 387,000 students ride to school each day on 6,100 buses. If rides average 30 minutes in each direction, students will spend 180 hours on buses each year, breathing in air which has several times more contamination than the air outside.

David Brown, Sc.D., a toxicologist with the Northeast States for Coordinated Air Use Management (NESCAUM) and EHHI collaborator on the study, said that diesel exhaust is comprised of very fine particles of

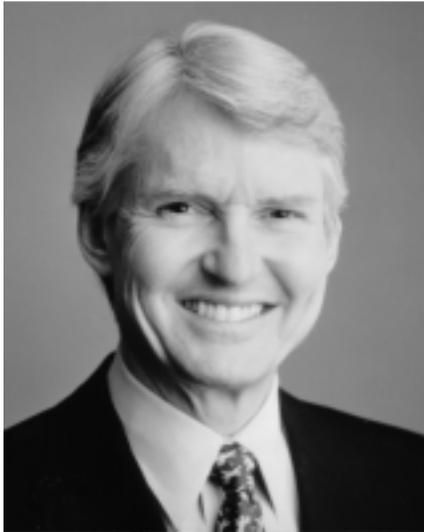


Kate Wargo with monitoring equipment

© Gale Zuckler/www.gzuckler.com

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Yale Alumni Kick-Start \$60 Million Campaign



Edward Bass

“Ed Bass’ support of interdisciplinary science, here at Yale and elsewhere, is unrivaled and exemplary,” Dean Speth.

Several noted Yale alumni and a renowned environmentalist have added tremendous momentum to the School of Forestry & Environmental Studies’ \$60 million capital campaign with their extraordinary gifts.

To date, \$36.8 million has been raised, including more than \$27 million for core endowment and facilities needs. “The school has made remarkable progress under Dean (James Gustave) Speth’s leadership,” University President Richard C. Levin said. “It is well on the way to its goal of international preeminence in environmental education and research.”

That the school has made “remarkable” progress owes in large measure to Joseph F. Cullman 3rd ’35 B.A. and Sara (Sally) Brown ’48 Grd. and her son Owsley Brown II ’64 B.A. for their generous gifts that have established two new endowed chairs; Gilman Ordway for his gift to help build a new home for F&ES; and especially Edward Bass ’67 B.S., ’72 Art.A. for his leadership gift. Earlier in the campaign, a gift from Joan and Richard Tweedy ’41 B.A., ’48 LL.B. also created an endowed faculty chair, the Tweedy/Ordway Professorship in Social Ecology, now occupied by Professor Stephen Kellert.

Last October, the school launched the public phase of the campaign, which is primarily intended to support faculty endowment, student scholarships and a new “green” facility for the school. The campaign announcement was made by President Levin to members of the school’s Leadership Council during a reception at the Yale University Art Gallery.

‘Powerful and Enduring Impact’

Bass, of Fort Worth, Texas, pledged a gift that Dean Speth has described as having a “powerful and enduring impact” on the future of the School. A 1967 graduate of Yale College who also studied at the graduate level at the Yale School of Architecture, Bass has been a committed environmentalist and generous supporter of environmental science at Yale for a number of years.

“Ed Bass’s support of interdisciplinary science, here at Yale and elsewhere, is unrivaled and exemplary,” Dean Speth said. “His new gift has given tremendous momentum to our effort, and his support as a trusted advisor and co-chair of our Leadership Council has been enormously important. We owe much of our success to Ed’s leadership, and are indeed grateful.”

Bass said: “Yale University is moving forward in environmental studies on several fronts and all of it is exciting and important. But the work of the School of Forestry & Environmental Studies is particularly essential, because it is where tomorrow’s environmental leaders are being prepared. And these are the individuals—broadly trained in science, management and policy—who will largely determine our success in meeting the environmental challenges of the new century.”

Bass has dedicated a great deal of his career to environmental issues. A successful investor and venture capitalist, he has helped to establish numerous ventures designed to integrate ecological awareness with economics. He is the co-founder of Biosphere 2, one of the world’s largest laboratories dedicated to studying, managing and sustaining the Earth’s ecosystems. He also founded the Philecology Trust to encourage environmental understanding and protection. In addition, he is the chairman of the Executive Committee of the World Wildlife Fund and serves on the executive committees of the New York Botanical Garden and the Botanical Research Institute of Texas. He was the founding chair of the External Advisory Board of the Yale Institute for Biospheric Studies. In September, he was named a Successor Fellow of the Yale Corporation, the University’s governing board.

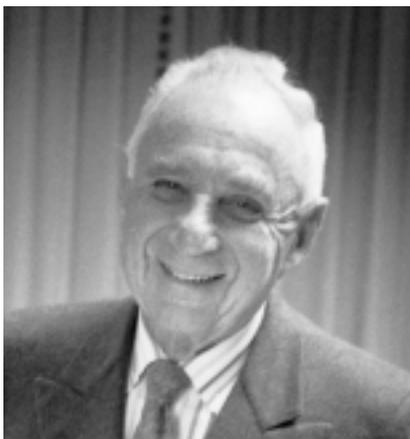
Bass is an experienced rancher with an interest in Fort Worth’s heritage as a cultural center of the Texas cattle industry. He manages ranch holdings in Texas and the Flint Hills of Kansas dedicated to the sustainable management of the tallgrass prairie ecosystems, including controlled burning and

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“Gil Ordway’s support...serves as a beacon to others...” said President Levin.



Gilman Ordway



Joseph F. Cullman 3rd

seasonal cattle grazing as a ranchland management tool. He also has ranching interests in Australia. What’s more, he is chairman of the Southwestern Exposition and Livestock Show, a major 23-day cultural event in Forth Worth. In addition to his environmental activity, Bass is Chairman and CEO of Fine Line Inc., a diversified venture and investment capital company. He is also an officer and/or director of various corporate entities through which he manages investment holdings and business ventures, including many family business interests.

Bass has offered his time, leadership, expertise and financial support to the University to maintain Yale’s tradition as a leader in the study of the environment. He accepted the opportunity to co-chair the Leadership Council for F&ES and was instrumental in recruiting several active council members. Along with Frances Beinecke, his fellow co-chair, Bass has so far presided over two well-attended, very successful Leadership Council meetings, the most recent last October.

Bass is married to Vicki Skinner Bass. His family has numerous ties to Yale through his brothers, Sid (’65), Robert (’71), and Lee (’79). Bass’ father Perry is a member of the Class of 1937.

His Gift a ‘Beacon’ to Others

Gilman Ordway ’47 B.A., owner of Fish Creek Ranch in Wyoming, recently has made a substantial lead gift in support of the design and construction of the planned new facility for the School. The new building will bring the entire F&ES program, now scattered among six locations, into a single interconnected complex. In addition, according to Dean Speth, “we intend for it to be a model for sustainable environmental design and resource efficiency—in the nation and the world.” Ordway’s gift brings the total raised for the new facility to \$13 million, or about half its anticipated cost. He previously created an endowment to the school for scholarship assistance for graduate and undergraduate students of the environment.

Ordway is an environmentalist, volunteer, philanthropist and private investor. He sees the state of the environment as the biggest problem in the world. After graduating from Yale, he obtained a law degree from the University of Colorado. In 1954, he settled in Jackson Hole and established the 382-acre Fish Creek Ranch, which he operates as a resort and cattle ranch. He is or has been a member of the board of directors of the Jackson Hole Land Trust, the Wyoming field office of The Nature Conservancy, Wilderness Society, World Wildlife Fund (U.S.), and the Woods Hole Research Center.

His family has close ties to Yale, including his father, Samuel G. ’08, three uncles, John G. ’07, Lucius P. ’14 and Richard ’25, two cousins John G. ’45 and Robert F. ’55, and a brother-in-law Richard Tweedy who are Yale graduates. Ordway has a distinguished track record of support to Yale, F&ES and the Yale Institute for Biospheric Studies, and is a member of the F&ES Leadership Council.

His abiding interest in environmental education and research and involvement with numerous national as well as regional organizations brings a comprehensive perspective to the Leadership Council. “Gil Ordway’s support will not only provide a visible boost to the school, but serves as a beacon to others to join him in recognizing and supporting the school at this unique time in its history,” said President Levin.

One of Yale’s Greatest Benefactors

Joseph F. Cullman 3rd has also committed a generous gift to establish a new endowed professorship at F&ES. The new professorship, established in perpetuity, will be called the Joseph F. Cullman 3rd ’35 Professorship. The incumbent occupant of the chair will focus his or her teaching and research in the areas of wildlife, ecology and biodiversity.

He said: “President Levin is fully committed to making Yale the world’s leading institution in environmental studies, and in Dean Speth and the School of Forestry & Environmental Studies we have absolutely the right individual and the right program to lead the way. My hope is that the Cullman Professorship will move Yale closer to attaining this extraordinarily important goal.”

Dean Speth calls Joe Cullman “one of Yale’s greatest benefactors, and a member of one of truly distinguished families in Yale’s history.” His father, Joseph F. Cullman, Jr. ’04, and his brothers, Arthur ’37, Edgar M. ’40 and Lewis B. ’41 attended Yale College. He added: “Joe has also been an exemplary environmentalist for many years and we are delighted and honored by his decision to make this

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Yale Alumni Kick-Start \$60 Million Campaign

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Sara (Sally) Brown

“It is a source of hope that Yale is taking the lead in the study of forestry management,” Sally Brown.



Owsley Brown II

CONTINUED from Page 5

wonderful gift to our School.”

Cullman has had a lifelong commitment to environmental issues. He is the honorary director of the Board of Directors of the World Wildlife Fund, which he has been associated with for 50 years. He also served as a trustee of the American Museum of Natural History and of the New York State Natural and Historic Preservation Trust and a member of the Smithsonian Institution. He is an honorary trustee of the Colonial Williamsburg Foundation and the National Urban League, chairman emeritus of the Atlantic Salmon Federation and chairman emeritus of the International Tennis Hall of Fame. Additionally, he is a member of the Leadership Council of the School of Forestry & Environmental Studies, an associate fellow of Branford College, and a recipient of the Yale Medal in 1974.

Cullman has been a leading businessman since 1954 when he joined the Philip Morris Companies. He was named Chairman Emeritus and Director Emeritus of Philip Morris in 1984. He served as President and Chief Executive Officer from 1957 to 1967 and Chief Executive Officer from 1967 to 1978.

Financial World magazine named Cullman one of the 10 outstanding chief executives of American business and industry in 1976, 1978 and 1979 as well as the most outstanding chief executive of the year in 1977. In the recent book *Good to Great*, Cullman is profiled as one of the most effective corporate leaders of the past half-century. He is one of seven family members who have attended Yale, dating back to 1904.

No ‘Rocking-Chair’ Environmentalist

With their substantial gift, Sally Brown, a noted environmentalist and her son, Owsley, have established a new endowed chair in climate change and energy.

Sally is a noted environmentalist who has a deep commitment to the environment. “I’m concerned with the loss of great forests of the world in Brazil in the Amazon basin,” she said. “It is a source of hope that Yale is taking the lead in the study of forestry management.” She is a major underwriter of the study for the redevelopment of the Louisville, Ky., waterfront. Brown was honored by the Kentucky Nature Conservancy to celebrate its 50th Anniversary in 2001. In addition, she served as a governor of The Nature Conservancy and received its highest honor, the Oak Leaf Award in 1989. Jim Aldrich, the vice president and state director of the Kentucky Nature Conservancy, called Brown a hero for her unique vision of conservation and dedication to Kentucky’s environment. She is the secretary of the W.L. Lyons Brown Foundation, and Owsley is Treasurer. In 1996, the foundation established an endowed fund to support Yale undergraduate musical groups. Prior to that, Sally made a family gift to name the large seminar room of the Music Library in Sterling Memorial Library.

Owsley, class of ’64, said his gift to the School of Forestry & Environmental Studies was to support his mother’s work and increase awareness of environmental issues. He is chairman and chief executive officer of Brown-Forman Corporation in Louisville. “I’m honoring my mother’s 40 years of work in trying to improve our understanding of man’s impact on the environment and improve our actions in light of that understanding,” he said.

She has proven that she is no “rocking-chair” environmentalist. Through her book, *The Palisades of the Kentucky River*, she helped draw attention to the environmental crisis that led to the preservation of the Palisades. In addition, she has been involved with the Woods Hole Research Center on their global climate change work. She believes climate change is a global challenge of extraordinary importance, and one that cannot be met without U.S. leadership. Being an environmentalist is more than an avocation—it’s a way of life for her. Despite important conservation gains, she knows the fight continues to preserve the environment.

“We are having to still fight for Alaska’s wilderness and the Arctic National Wildlife Refuge and the need to educate the current Administration,” she said. “We do live in an exciting time for forests and the sustainability of this planet, and I am very impressed by the work the Yale School of Forestry & Environmental Studies, under Gus Speth’s leadership, can do in this area. Owsley and I are delighted that we can support these important efforts.”

Can We Talk?

To promote dialogue on important environmental issues, F&ES has sponsored an impressive series of events featuring an impressive group of scholars since the beginning of the academic year:

Eleanor Sterling, Director of the Center for Biodiversity Conservation, The American Museum of Natural History, “Integrating Science into Conservation Decision-Making; Where Theory Ends and Reality Begins.”

Callum Roberts, Senior Lecturer, Environment Department, University of New York, “Marine Reserves Can Work for Migratory Species Too!”

Mike Finley, President, The Turner Foundation, “Investing in Conservation and the Environment: the New Reality.”

Deborah McArdle, Marine Advisor, University of California Sea Grant Cooperative Extension, “Top Down Versus Bottom Up Approaches to Marine Reserve Design and Implementation: A Case Study from the Channel Islands, Calif.”

Matthew Cahn, Professor of Political Science, Cal State, Northridge, “Linking Science to Decision Making in Environmental Policy: The Case of Marine Protected Areas.”

Greg Stone, Director of Conservation, New England Aquarium, “Marine Research and Conservation from the Antarctic to the Equator.”

Lu Zhi, Associate Professor, Beijing University, Visiting Faculty, Yale School of Forestry & Environmental Studies, “Challenges of Conserving China’s Biodiversity,” and “Panda, People Policy: Challenges to China’s Biodiversity.”

Magali Delmas, Assistant Professor of Business Strategy, Donald Bren School of Environmental Science & Management, University of California, “In Search of ISO: What Explains the Global Diffusion of ISO 14001.”

Aseem Prakash, Assistant Professor, Department of Strategic Management and Public Policy School of Business and Public Management, George Washington University, “ISO 14001: Explaining Cross-National Variations.”

Marian Chertow, Director, Industrial Environmental Management Program, Yale School of Forestry & Environmental Studies, “The Protracted Transformation to Environmentally Sustainable Technology.”

Steve Sanderson, President & CEO of the Wildlife Conservation Society, “Creating Political Models for Wildlife Conservation.”

Kent Redford, Director of Biodiversity Analysis and Coordination at the Wildlife Conservation Society, “Contested Tradeoffs: Poverty Alleviation and Biodiversity Conservation.”

Jamil Mahuad, Former President of Ecuador, “Ecuador—Peru: How the Peace Was Won.”

Deb Callahan, President, League of Conservation Voters, Conservation Leadership and the New Reality.”

Daniel Esty, Associate Professor for Environmental Law and Policy, Yale School of Forestry & Environmental Studies, Monica Araya, Viviana Araneda, “Globalization and Environment: The Result of the World Trade Organization Ministerial Meeting in Doha.”

John Mitchell, Environment Senior Editor, National Geographic Magazine, “Writing & Editing the Environment at National Geographic.”

Kwabena Asamoah Darko, Ghana Institute of Management and Public Administration, Accra Ghana, “Meeting the Environment Needs

of the Urban Poor: Governments, Businesses or Partnerships? Perspectives from China, Ghana, India, Peru, Philippines, Ukraine.”

Mr. Shi Han, Director, Center for Environmental Sound Technology Transfer, Beijing, People’s Republic of China, “Meeting the Environment Needs of the Urban Poor: Governments, Businesses or Partnerships? Perspectives from China, Ghana, India, Peru, Philippines, Ukraine.”

Professor Jamal Husain Ansari, New Delhi, India, “Meeting the Environment Needs of the Urban Poor: Governments, Businesses or Partnerships? Perspectives from China, Ghana, India, Peru, Philippines, Ukraine.”

Peter Auster, Science Director, National Undersea Research Center, UCONN, “Fish, Fishing, and Conserving Biological Diversity: The Case of Marine Reserves.”

Tundi Agardi, Executive Director, Sound Seas, “Marine Protected Areas: A Vital Tool for Conserving Nature and Resolving Conflicts.”

Steven Gaines, Director, Marine Science Institute, UCSB, “Current Oversights in the Design of Marine Reserves.”

Elliot Norse, President, Marine Conservation Biology Institute, “Fishing with Bulldozers or Where Have All the Cod Gone?”

Roger Griffis, Policy Advisor, NOAA, U.S. Department of Commerce, “Building a Nationwide Network of Marine Protected Areas: Challenges and Opportunities.”

Wangari Maathai, Founder, The Green Belt Movement in Kenya, “Sharing the Experience of the Green Belt Movement.”

Elliot Mainzer, Enron Corporation, “The Meltdown in Western Electricity Markets: Implication for Green Power.”

George Schaller, Wildlife Biologist and Vice President, “Research and Expedition in Wildlife Conservation Society, A Naturalist Looks at Conservation.”

Amory Lovins, Rocky Mountain Institute, “Natural Capitalism and Energy Security.”

Jerry Franklin, Professor, Forest & Ecology, University of Washington, “Gang of Four Revisited: Science, Policy and Politics of Sustainable Forestry.”

Victor Gonzalez, Windmar R.E., S.E., “Offshore Wind Power and Sustainable Industrial Development in Puerto Rico.”

Andrew Hoffman, Assistant Professor of Organizational Behavior, Boston University School of Management, “Institutional Evolution and the Diffusion of Corporate Practice: Competitive Environmental Strategy.”

Norman Myers, Scientist, “Our Environmental Prospect: Time of Breakdown or Breakthrough?”

Roger Payne, President, Ocean Alliance, “Marine Protected Areas: How Can We Offer Them Real Protection?”

James Bohnsack, Research Fishery Biologist, NOAA Fisheries, “Marine Reserves, Ecosystem Management, and Aldo Leopold’s Biotic Ethic.”

Richard Pollnac, Professor, of Anthropology and Marine Affairs, URI, “Exploring Successes and Failures of Community-Based Marine Protected Areas in the Visayas, Philippines.”

Leadership Council News & Highlights

Leadership Council Addresses Strategic Plan, Academic Initiatives and Capital Campaign

Fifty-five members of the Leadership Council, which includes business and professional leaders, academics, and environmental leaders from the U.S. and abroad, turned out for the council's second annual meeting at Yale last October.

The two-day meeting included a report and discussion on the school's extraordinary progress in implementing its new strategic plan, and working sessions with council members, faculty and staff that focused on F&ES' work in New Haven, project research on industrial ecology in Asia, and a distance learning initiative linking F&ES with 17 other countries.

At a cocktail reception at the end of the first day's session, Yale President Rick Levin announced the launch of the public phase of the school's new capital campaign, with a minimum goal of \$60 million for faculty and programs, scholarships and a new environmentally green building to house F&ES. The President also announced that more than \$32 million had been raised toward the goal (since then the total has risen to \$36.8 million.) Working sessions on the final day included discussions of forest certification, biodiversity and ecosystem management and restoration, and the next generation of environmental policy and governance.

The Leadership Council of the School of Forestry & Environmental Studies is led by Co-Chairs Frances Beinecke and Ed Bass. It supports the school's efforts to become the world's finest and first truly global school of the environment as well as the development of Yale University as the leading institution worldwide in environmental education, research and policy in the 21st century. The council provides strategic support and advice to the Dean and the leadership of the university in achieving these critical goals.



I-r: Peter Seligmann '74 M.F.S., University President Richard C. Levin, and Dean James Gustave Speth.



I-r: Gaboury Benoit, Professor of Environmental Chemistry & Co-faculty Director of the Hixon Center for Urban Ecology; Colleen Murphy-Dunning, Director of the Urban Resources Initiative (URI); Jody Bush, Chair of the URI Board of Directors, Joseph Hixon '60 B.A.; Stephen Kellert, Tweedy/Ordway Professor of Social Ecology and Co-faculty Director of the Hixon Center for Urban Ecology.



I-r: Yolanda Kakabadse, who completed in January a one-year term as the Professor in the Practice of Biodiversity Conservation, with Roger Mellem '80 M.S.L., Scott Wallinger '61 M.F., and Peter Seligmann '74 M.F.S.



Frances Beinecke '71 B.A., '74 M.F.S., Thomas Lovejoy '64 B.S., '71 Ph.D., and Edward Bass '67 B.S., '72 ArtA.



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1: Kim Thurlow '02 M.E.M. Cand. and Dorceta Taylor '85 M.F.S., '88 M.A., '88 M.Phil.

2: Al Jubitz '66 B.S., and Nelson "Bud" Talbott '43 B.S.

3: Daniel Esty, left, Director of the Center for Environmental Law and Policy, and James Lyons, Professor in the Practice of Natural Resource Management.

4: David Schiff '58 B.E., Jonathan Rose '74 B.A., and Edward Strohbehn '62 B.A., '63 B.E., '66 M.A., '69 LL.B.

5: Dean Speth, left, and Anthony Grassi, Chairman of The Nature Conservancy Board of Governors

6: Michael Dowling, '74 B.S., '82 M.F.S., '82 M.P.P.M., and Al Sample '80 M.F., '88, M.B.A., '89 D.For.

7: James Rogers '72 B.S., '74 M.S.

8: Thomas Graedel, Clifton R. Musser Professor of Industrial Ecology and Director of the Center for Industrial Ecology

9: Ambrose Anoruo '88 D.For.

Hidden Dangers Pesticides to Diesel Exhaust



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10 STEPS YOU CAN TAKE TO PROTECT CHILDREN FROM ENVIRONMENTAL HAZARDS

Water, air, food, and consumer products are the key elements of a child's environment that are likely to affect health, and the advice that follows could reduce children's exposure to environmental hazards.

Water: Test your water for contaminants. Lead testing is especially important for apartment dwellers, because flushing may not be as effective in high-rise buildings with lead-soldered central piping. Lead leaches more easily from hot water lines than cold, so be certain never to mix infant formula with hot tap water. If your water is drawn from a private well, have your water tested for pesticides, metals, and other possible contaminants by a state certified laboratory. Be especially cautious if you have a well and live next to farmland, on former farmland, or near industrial, commercial or institutional facilities. The major contaminants of concern for children are metals, fertilizers, pesticides, fuels, and solvents.

Prohibit Indoor Tobacco Use: Do not permit smoking in your home, vehicles or office.

Radon: Test your home to determine if radon is a problem. If detected, consult your local health officials about ventilation techniques. Radon in your water can lead to significant health risks.

Avoid Diesel Exhaust: Limit your child's exposure to diesel exhaust. Consider the guidelines in this article.

Carpets: Limit the amount of carpet used in your home, whenever possible use wool or cotton rugs. Carpets are reservoirs for chemicals, molds, and animal dander, and they are difficult to clean. They may encourage build-up of molds in humid climates and damp locations.

Renovate When Warm: Try to schedule your painting, floor refinishing and renovation during seasons when you can keep windows open to ventilate fumes and dusts. Use "low-VOC" or "no-VOC" paints. Read the label on your paint can. One gallon of oil-based paint may contain 5 pounds of volatile organic compounds that are released to air after the paint is applied. Water-based paints contain approximately one-third this amount. "No-VOC" paints are now available, and commonly used in hospitals and nursing homes.

Breastfeed Your Babies: The American Academy of Pediatrics recommends that breastfeeding provides the healthiest milk for babies. There is also evidence that breast-feeding reduces the risks of asthma and cancer and may increase intellectual development. The nutritional, psychological and immune system benefits are also very important.

Eat Low on the Food Chain: Eat fresh fruits and vegetables several times per day. Avoid animal fats. This can reduce your intake of the persistent chemicals that may accumulate in the fat of fish and animals. Try to buy these foods from a certified organic grower.

Avoid Pesticides: Especially avoid indoor applications. Residues may persist long after homes are sprayed. If you have a nuisance insect problem, try to control the problem physically rather than chemically. Check screening of doors and windows to prevent insect entry. Try to minimize food crumbs, spills and scraps that attract insects on floors, counters and cabinets.

Store Hazardous Products Safely: In 1999, there were more than 2.5 million poisonings in children under 6 years old. Nearly 30 percent of these poisonings were caused by pharmaceuticals; 13 percent were caused by cosmetics and personal care products and 11 percent were caused by cleaning substances.

...students
routinely experience
bursts of elevated
chemical levels in
exhaust during the
ride to school...

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carbon and a mixture of gases, including benzene, formaldehyde, 1,3-butadiene and acetaldehyde. It contains dozens of chemicals that are listed as Hazardous Air Pollutants under the Clean Air Act.

“These are well-recognized toxic substances,” said Dr. Brown. “Most federal health authorities, including the National Toxicology Program and the EPA, have designated several components of diesel exhaust as human carcinogens.”

Professor Wargo began the study on the impact of diesel exhaust from Connecticut school buses more than a year ago, collaborating with other Yale faculty members who make up the working board of EHHI including Mark Cullen, M.D., professor of medicine and public health, Robert LaCamera, M.D., professor of clinical pediatrics and nursing, and Dr. Brown, also a Yale research affiliate who has worked with the Centers for Disease Control and Prevention (CDC), and Nancy Alderman M.E.S. '97, president of EHHI.

To aid in the collection of information in the study, 15 public school students, including Professor Wargo's 13-year-old daughter, Kate, wore monitors to record airborne particles and 55 volatile gases in diesel emissions during their school day. Air quality monitoring was conducted by the University of Connecticut's Environmental Research Institute.

What the team discovered was disturbing: students routinely experience bursts of elevated chemical levels in exhaust during the ride to school, especially when traveling through traffic behind other buses or trucks and while the buses are idling when picking up and dropping off students. Keeping the windows of moving buses closed—common practice in Connecticut—only increased the concentrations of air toxics.

Sitting in his office overlooking other Yale buildings that line Prospect Street, Professor Wargo speaks carefully about the findings described in the 76-page study. He pulls out a graph from the study that shows student exposure to particulate concentrations (PM_{10} , or less than 10 microns in diameter) on one day last spring, from 7:37 a.m. to 3:30 p.m. Steep spikes appear at both ends of the day: these are the bus rides, when concentrations were several times the state of Connecticut estimate of average 24-hour concentrations for the community.

Another chart projects that the New Haven background concentrations will exceed the federal standard for fine particulate exposure ($PM_{2.5}$, or less than 2.5 microns in diameter) of 15 $\mu\text{g}/\text{m}^3$ when it becomes effective next year. (The federal standard is calculated by averaging 24-hour levels over three years, the last of which is this year.)

Professor Wargo explains that during 27 different bus runs along an experimental route, all diesel buses had interior concentrations exceeding the state of Connecticut average 24-hour background rate for fine particulate matter ($PM_{2.5}$) of 12.5 $\mu\text{g}/\text{m}^3$. Highest concentrations within buses often exceeded background levels by nearly 10 times. Concentrations were always higher when windows were closed rather than open.

How, he has asked himself, has this situation with diesel fuel exhaust and our children escaped regulation so long? Possibly, he suggests in the kindest scenario, it is because the government has never tested pollution within school buses and it is not predicted by the 13 fixed-site air monitoring stations for fine airborne particulate concentrations in Connecticut. These sites don't really capture the true variability of particulate matter in the air.

The 13 stations were set up in response to regulations adopted by the EPA in 1997. The monitoring stations are comprised of white boxes resembling weather stations, and are scattered around the state.

“If, instead, you set up a monitoring system that follows individuals as they move through their daily life, from home to school bus, to school, to the vehicle, to soccer practice, wherever they go, you develop a completely different image of the exposure,” he explains. “Our findings undercut the presumption that exposure is uniform and that the state captures the variability that is out there with these 13 fixed monitoring facilities.”

The danger of a severely limited monitoring effort, he adds, is that it creates a false impression that the variability of pollution is well known and that hazardous exposures are being prevented. “From

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Hidden Dangers Pesticides to Diesel Exhaust

“We’re not telling parents to keep kids off the bus. We’re saying the ride to school could be healthier,” said Professor Wargo.

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my perspective nothing could be further from the truth,” he states.

He believes the whole concept of averaging—in this case, air particulate concentrations and time periods—must be challenged. Averaging, he explains, creates the impression of uniform low-level exposure, since peaks during bus rides and near heavy traffic are averaged with lower levels found at fixed monitors during nights and weekends when industrial activity and traffic intensity are far lower.

“As averaging periods are lengthened, the periods of intense exposure are obscured,” he explains. “The politics of air pollution regulation is quite simple: those who pollute want the government to average pollution measurements over long periods of time, and this makes the shorter dirty episodes invisible to the public.” This may explain, he continues, why current federal law allows pollution levels to be averaged over three years.

The EHHI study attracted widespread media attention. The local affiliates of the major television networks, including CNN, interviewed the research team at the press conference in Hartford. Professor Wargo also appeared in a segment on Good Morning America after a television crew spent eight hours following him and his daughter around Connecticut schools and bus routes to film the story of the diesel research. Footage from his appearance on Good Morning America aired on ABC News with Peter Jennings.

In anticipation of critics who might challenge the idea that they could measure school bus emissions without including exhaust from other vehicles on the road, Professor Wargo and his colleagues designed and carried out some of their experiments in rural parts of the state. They measured air quality on school buses running through rural routes with virtually no traffic. With engines turned off, interior levels of particles and black carbon were similar to background levels reported by state monitoring. When the engines were turned on, the meters often recorded a jump in both particles and carbon. Black carbon levels inside the buses increased at stops, especially if the windows were closed. In addition, they measured carbon levels in moving buses and found them also to be higher when windows were closed. Only when buses were moving in rural areas with open windows did the particulate levels fall to background levels. At each bus stop, particulates could enter the bus through the opened door. Highest outdoor concentrations of particulates in the study were found within or near school buses, or along routes with heavy traffic. These were five to 10 times higher than background rates.

American children spend an average of between 80 to 90 percent of their time indoors but air quality indoors and air within vehicles is not regulated by either the EPA or the state of Connecticut, except by the prohibition of smoking tobacco in public facilities and vehicles. Routine emissions testing for school buses is not required by federal law and school buses are specifically exempted from testing in Connecticut.

The EPA adopted tougher emissions standards for heavy-duty diesel engines in 2000, however they will not be phased in until 2006 to 2010. The results, therefore, won’t be seen until early in the next decade. These regulations require the reduction of sulfur content of the fuel, and reduced emissions from new engines. In 2001 the EPA implemented regulations reducing the sulfur content of highway diesel fuel by 97 percent between 2006 and 2009. Trucks and buses, beginning in model-year 2007, must have engines that produce 90 percent fewer particulate emissions than current models. By 2010, nitrogen oxide emissions must be reduced by 95 percent from current levels. Air quality will improve slowly in response to these changes after 2010, as current model truck and bus engines have extremely long lives.

Professor Wargo said that recent regulations on diesel engines may have a dubious result. As the size of emission particles has become finer, their visibility has been reduced, but they may be more deeply inhaled into the lungs; ultrafine spherical carbon particles can actually become trapped deep

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within lung tissue.

The EPA estimated that the new standards, when fully implemented in 2010, would result in 8,300 fewer premature deaths, 17,600 fewer cases of childhood acute bronchitis and 360,000 fewer asthma attacks per year. Reflecting on these estimates, Professor Wargo has become impatient with the pace of innovation and regulation; he believes the evidence is now sufficient to take precautionary actions.

Professor Wargo, himself father of three, believes it is possible to reduce children's exposure to diesel emissions immediately. The study includes concrete suggestions to federal, state and local

governments, including enforcement of the prohibition of bus idling, a voluntary measure which was just implemented in January. While loading and unloading students, buses are parked so close to each other that the tailpipe exhaust from one bus enters the open door of the bus behind it. The experiments show that bus idling often resulted in heightened concentrations of both particles and black carbon within the bus passenger compartments. This is the only time when open windows make the situation within the bus worse.

To the federal and/or state government, the study further recommended that existing school buses should be retrofitted with particle traps and catalytic converters designed to reduce emissions by 2003. This will be tried in the pilot program the DEP has announced for the Norwich area. That pilot program will also experiment with use of low emission fuels and tests of tailpipe emissions on school buses, both measures called for in the study.

To local governments, the group recommended limiting the amount of time students spend on buses. He also suggests that the local districts assign the cleanest-running buses to the longest routes. In addition, he advocates the need for routine maintenance on buses and relocation of bus parking facilities further from schools and playgrounds.

"Children are exposed to diesel exhaust from school buses at levels far above those predicted by current government monitoring efforts," Professor Wargo said. "But we're not telling parents to keep kids off the bus. We're saying the ride to school could be healthier."

Asthma: Dramatic Increases

At the February news conference, EHHI President Nancy Alderman said that with asthma rates rising in the state and across the country, it is "extremely important" that a closer look be taken at what are the actual diesel exhaust exposures to children from their school buses. The illness has increased dramatically among children in the U.S., and now affects nearly 5 million children or 7 percent of the population between birth and 18 years of age. It has become the most prevalent chronic disease among children, with its prevalence highest in urban areas. The Centers for Disease Control reports that asthma-related death rates for this group increased by 78 percent between 1980 and 1993. In a study designed by Dr. Mark Cullen, EHHI found in 2000 that nearly

44,500 school-aged children in Connecticut have been diagnosed with the illness. While this is an average of 8.7 percent of the children, in some Connecticut schools the rate jumps to 20 percent.

From his prior work, Professor Wargo knew that children were more sensitive to pesticides because their bodies are smaller and still developing. As a result, he was not surprised to learn of their heightened susceptibility to asthma. Pound for pound, children breathe nearly twice the amount of air inhaled by adults.

The dangers of diesel emissions for children depend upon the concentration of exhaust they inhale, and the amount of time spent on buses—on average approximately 180 hours a year. It is dangerous to assume, he says, that the short-term high-intensity exposures, such as those

An exceptional group of graduate students working with Professor Wargo is examining different scientific and legal strategies to better understand and manage environmental threats to human health. They include:

Jeffrey Albert is exploring the spatial variability in irrigation practices, water quality and water rights in the Jordon River Basin in Israel.

Sanjay Baliga is examining Tanzania's capacity to manage hazardous chemicals, focusing on pesticides.

Carlos Gonzalez is examining pharmaceutical residues in the international beef supply, and the differing standards imposed in the U.S. and European Union.

Wendy Gordon is comparing U.S. and European agricultural product certification programs.

Aarti Gupta is conducting an analysis of an international treaty that requires prior notification of genetically modified products in international trade, known as the Biosafety Protocol.

Achim Halpaap is researching public participation in hazardous chemical management in South Africa under its new constitution.

Judith Pongsiri is exploring the use of DDT and other less persistent chemicals to control malaria in Mexico and South Africa.

Leigh Shemitz is examining the prevalence in New Haven of asthma and its connection to air pollution.

Hidden Dangers Pesticides to Diesel Exhaust

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John Wargo, his wife Linda, and their daughter Katie at their Killingworth, Conn. home.

experienced by children on school buses, are irrelevant to respiratory health.

F&ES graduate student Leigh Shemitz is examining the severity in New Haven of asthma, and is one of several of Professor Wargo's graduate students who are working on a broad range of subjects concerned with environmental risk at sites around the globe (see box on page 13).

Dr. Cullen of the School of Medicine, who is also director of Yale's Occupational and Environmental Medicine Program, recently found in another study sponsored by EHHI that asthma prevalence within individual Connecticut schools ranged between 3 percent and 20 percent.

Dr. Cullen said, "Although we do not fully understand the relation between diesel exhaust and asthma prevalence, we do know that components of diesel exhaust can adversely affect lung function in children with underlying respiratory illnesses such as asthma, bronchitis, and infections. Children's airways are not yet fully developed and have a smaller diameter than those of adults. Given these conditions, it may be more difficult for asthmatic

children—with restricted airways—to clear the very fine particles and gases inhaled deeply within their lungs."

Diesel Exhaust, Pesticides: Different Studies, Similar Histories

"The special concern for children from diesel exhaust parallels the special risks children have from other forms of pollution such as pesticides," Professor Wargo says, referring to his book, *Our Children's Toxic Legacy*. "Medical research demonstrates that the young are often more susceptible to health loss from pesticides for numerous reasons, including their rapid rates of growth and development, and immature detoxification and elimination capacity. Diesel exhaust may also pose a special hazard to children since the human lung does not mature until roughly the age of 20." This has been borne out by studies on environmental tobacco smoke and other pollutants that show high levels of exposure can retard lung development of children and that there is also danger to pregnant women and their unborn fetuses.

In *Our Children's Toxic Legacy* he shows that in 1995 there were 75 different pesticides permitted by federal regulation to remain as residues on apples and 100 separate pesticide regulations limit residues in milk. Coupled with food intake statistics for children, these figures are particularly disturbing because children consume seven times as much milk as the average adult, infants more than 15 times the relative amount of apple juice found in the average U.S. diet.

Thousands of pesticide products are permitted by current law to be released indoors, and the EPA has not distinguished between residential and school settings. He points out in the book that among the 70,000 chemicals sold internationally, the EPA attempts to set limits for about 2 percent, including 750 pesticides, 195 hazardous air pollutants, and fewer than 100 drinking water contaminants.

The book won the American Association of Publishers award as the Best Scholarly and Professional

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Book in Government and Political Science published in 1996. The following year, Professor Wargo was recipient of the American Writers Association Award of Excellence in Medical Communications for his work in the book.

He is critical of the one-size-fits-all approach to regulations on both pesticides and diesel emissions. He believes that children should be protected differently than adults, especially in respect to those things they consume in disproportionate amounts or frequencies: drinking water, certain foods, and the air in school buses. “My research has explored the most vulnerable group and the most exposed,” he says. Likening it to the type and concentration of foods that constitute children’s diets he feels attention should be given to the diversity of air pollutants children breathe each day. Compounding exposures should also be considered. Imagine, he says, an asthmatic child living in a home with wood heat, parents who smoke, and sitting on a school bus for two hours per day. “None of these exposures are regulated by law.”

Professor Wargo, who has served on the EPA’s Scientific Advisory Panel/Board for Pesticides for about five years, learned early on that there is no legal distinction between what chemicals can be used in residences and schools in Connecticut. In 1999 he worked with EHHI on its project to examine the pesticide uses in Connecticut schools. It found that a third of the school districts in Connecticut were spraying pesticides routinely, whether or not they had a pest problem. Also, no structure was in place to notify parents or teachers when pesticide spraying was to take place. As a result of this work, a new law was passed in Connecticut that included a provision for notifying people who had their names placed on a school registry. But, Professor Wargo says, the registry system doesn’t work well—either the schools don’t follow through on setting up a registry or the parents don’t understand that they have to ask to have their names added to it. “Still, we’re always learning what works and what doesn’t through these experiments in science and policy. In this case we learned the limits of registry systems, and the importance of requiring parental consent.”

One of Professor Wargo’s long-term hopes is that a field of educational medicine will develop, in a way similar to occupational medicine. Schools, he believes, are “terrific laboratories” for the study of environmental health since they hold a confined population on a regular basis for a significant portion of children’s waking hours. And they are a relatively captive, manageable audience.

“We have increasing evidence that children’s immune, endocrine, and nervous systems are sensitive to physical, biological and chemical contaminants in children’s environment. Much more research is needed to understand variability in sensitivity among children, and thresholds of safe exposure. In the meantime, it pays to be cautious by reducing unnecessary exposures to known toxic substances such as pesticides, solvents, and combustion by-products such as diesel emissions.”

Responsibility and Burden of Proof

At the root of much of his concern is a viewpoint of responsibility: He believes that the burden of proof of safety should be on those who promote hazardous technologies to demonstrate safety, rather than on the public to show that they are dangerous. “Among 750 active pesticides,” he asks, “how many have been tested for effects on developing nervous systems?” The answer: 10. There are 20,000 different pesticide products registered in the U.S. and Professor Wargo says it is simply presumed that that most of these are non-toxic. “We shouldn’t have to prove that pesticides—intentionally toxic substances—are harmful,” he says. “Instead we should require that they be proven to be reasonably safe before allowing them on the market.”

In his book on pesticides, he laments that environmental laws have moved at a glacial pace and have not examined vital questions about the risks we face in daily life. “What did we learn by the history of lead?” he asks, referring to the ancient metal which is highly durable and was used extensively until it was finally discovered to be toxic and then widely banned. It had been used for years in water pipes, paints, insecticides and gasoline—causing cumulative poisoning and death.

Among 750 active pesticides, only 10 have been tested for their effects on developing nervous systems.

Hidden Dangers Pesticides to Diesel Exhaust

Government has never addressed our daily exposures to complex and ever-changing mixtures of hazardous chemicals.

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Although levels of lead 20 years ago were 10 times higher than today, the CDC still considers lead poisoning the foremost environmental health threat to children and reports that nearly one million children in the U.S. have enough lead in their blood to reduce intelligence and attention span, cause learning disabilities and permanently damage a child's brain and nervous system.

Common Sense Solutions for Parents and Policymakers

John Wargo and his wife, Linda Evenson Wargo M.E.S. '84, have just completed a comparative study of key environmental threats to children's health, titled *The State of Children's Health and Environment in 2002; Common Sense Solutions for Parents and Policymakers*. The review is a factual summary that is providing background for a new book Professor Wargo will publish this year with Yale University Press, *Taking Control: Children's Health and Environmental Quality in the 21st Century*. The review is an eye-opener for anyone who has not yet realized that today's children face far more significant challenges to their health from daily exposure to chemical mixtures than from the recent threat of bioterrorism.

Listing health problems, such as asthma, cancer, birth defects and the chemicals that can be traced to them, they describe the absence of hazardous chemical testing requirements under current law. Fewer than 10 percent of the chemicals traded in commerce have undergone even a basic set of tests necessary to understand how the chemicals may move through the environment, where they come to rest, how children and others are exposed, and the toxic effects they might have on health.

"Government has never addressed our daily exposures to complex and ever-changing mixtures of hazardous chemicals," they say in the introduction. "Their scientific and legal capacity to do so must be questioned." They urge regulatory bodies to become more strategic, to concentrate on the most potent chemicals and the most concentrated exposures for children.

Until that happens, however, the Wargos give those who manage children's environment in residential environments some guidelines (see page 10). They offer suggestions on how to protect against water, air and food contamination and how to handle other consumer products which may be hazardous. "The simplest solution is to keep risky substances out of the environments where children live, learn, play and travel," they conclude.

Professor Wargo has often worried that the presumption of innocence regarding both pesticides and diesel exhaust is too strong and regulations are delayed too long, until the "evidence is strong enough." Unfortunately, the problem will be with us for a long time, as more than 20,000 pesticide products are still in the marketplace; and school buses constitute only a small fraction of all diesel vehicles.

However, as this article went to press, the U.S. Senate energy bill had been rewritten to include a Green School Bus Pilot Program that would authorize \$260 million over four years to begin renewal of the nation's bus fleet with low emissions vehicles. "The federal initiative is quite significant," Professor Wargo said. "It would go a long way to reduce the problem if the funds were allocated strategically to replace the oldest, dirtiest buses in areas where air quality is still out of compliance, primarily urban centers."

In Connecticut, the House environment committee introduced a bill that requires bus idling limits, retrofitting the existing fleet with particle traps, and the use of low sulfur fuel, all of which are recommendations in the report. If the Connecticut legislature passes this bill into law, it "will reduce children's exposure to exhaust from buses substantially in Connecticut," he said.

EHHI: Putting Human Health at the Center of the Environmental Agenda



Environment and Human Health, Inc. (EHHI), whose mission is to protect public health from environmental harms through research, education and the promotion of sound public policy, has achieved remarkable success in placing public health at the center of the environmental agenda since its creation five years ago.

Led by its energetic and committed president, Nancy Alderman, M.E.S. '97, the North Haven-based non-profit organization has produced several groundbreaking studies on pesticides, asthma and diesel exhaust that have influenced public policy, led to changes in state law, and protected thousands of children and consumers from environmental harms.

EHHI's educational and research muscle derives from a working board of public health professionals, including **Alderman**; **David Brown**, Sc.D., a toxicologist with the Northeast States for Coordinated Air Use Management (NESCAUM); **Russell Brenneman**, environmental lawyer and former chairman of the Connecticut Bar Association; and five additional board members who all happen to have Yale affiliations: **Susan Addiss**, a graduate of the Yale School of Epidemiology and Public Health and a past commissioner of the Public Health Department for the state of Connecticut; **Mark Cullen**, M.D., professor of medicine and public health; **Robert LaCamera**, M.D., clinical professor of pediatrics; **Susan Richman**, M.D., assistant clinical professor of gynecology and obstetrics; and **John Wargo**, professor of environmental risk analysis and policy at the School of Forestry & Environmental Studies.

In 1999, EHHI released two studies: "A Survey of Private Drinking Water Wells for Lawn and Tree Care Pesticides in a Connecticut Town" and "Pest Control Practices in Connecticut Public Schools."

In the first study, EHHI investigated the relationship between suburban pesticide uses and residential well contamination. The research found that 11 percent of the private wells tested had trace levels of contamination from lawn and tree care pesticides, with some wells containing four or more pesticides. The study includes helpful recommendations to prevent pesticide contamination for the state, towns and municipalities, and citizens.

The second survey of pesticide uses in Connecticut schools revealed that of 147 school districts surveyed, more than one-third were spraying their schools routinely, whether or not they had a pest problem. Also, it was discovered that individuals did not have to be trained or certified to spray pesticides in a Connecticut school, that notification of teachers or parents before pesticides were applied was not required, and that record keeping was not mandated.

To remedy this situation, EHHI provided the expertise to help craft a Connecticut state law that was passed in the fall of 2000 that addresses these issues and protects school children and teachers from pesticide exposures at school.

In 2000, EHHI completed a study that surveyed school nurses in Connecticut to determine the prevalence of asthma among the state's school-age population. The study included 513,688 school children and of that number, 44,571, or 1 out of 11 children, had doctor-diagnosed asthma. As a result of the report, the Connecticut legislature passed an asthma tracking law, which included the EHHI tracking model for asthma prevalence.

In addition, EHHI created a short and easy-to-read brochure, "Twelve Steps to a Healthier School." The brochure addresses subjects such as how to prevent mold, proper ventilation for art rooms in schools, precautions for schools undergoing new construction, tips to ensure that new carpets are non-toxic, and how to treat pressure-treated wood playground equipment so it will not cause arsenic exposures.

Most recently, EHHI released a report on "Children's Exposure to Diesel Exhaust on School Buses," which was conducted in cooperation with the Environmental Research Institute (ERI) at the University of Connecticut (see cover story).

For information about EHHI, visit its web site (www.ehhi.org) or call Nancy Alderman, 203-248-6582.

AT THE School



DORIS DUKE
CHARITABLE FOUNDATION

F&ES is one of the original schools to have received a Doris Duke Conservation Fellowship grant.

Doris Duke Charitable Foundation Gives \$975,000 for Conservation Fellowships, New Two-Year Grant to Evaluate Forest Certification

The Doris Duke Charitable Foundation has awarded \$975,000 for Conservation fellowships and to conduct an evaluation of forest certification.

The foundation recently gave the school a five-year grant of \$625,000 to extend the school's participation in the Doris Duke Conservation Fellowship Program. Each year under the program, approximately 10 master's degree candidates will receive tuition, internship, and loan repayment support. Also, the Doris Duke Charitable Foundation awarded a new two-year \$350,000 grant last October to conduct an evaluation of forest certification under the Forest Stewardship Council to determine the effectiveness of its certification system in improving forest management and assessing its impact on the United States.

Doris Duke Conservation Fellowships are awarded to graduate students who are dedicated to preserving the rich biodiversity of the United States and who show outstanding promise as future leaders in nonprofit or governmental conservation. The Fellowships are supported by grants from the Doris Duke Charitable Foundation to selected universities. Universities are chosen for the grants based on their superior interdisciplinary environmental programs and a commitment to produce conservation practitioners.

Doris Duke Conservation internships afford Yale students the opportunity to work with mentors, study major conservation issues, and implement solutions with such organizations as The Nature Conservancy, Environmental Defense, New York Botanical Garden, National Parks Conservation Association, Oxfam America, local land trusts and, in the public sector, the USDA Forest Service.

"Our School is one of the original schools to have received a Doris Duke Conservation Fellowship grant," said Dean James Gustave Speth. "We are pleased that the grant has been extended so that we can continue to attract and graduate the next generation of environmental leaders in conservation of the biota of the United States."

Dove and Graedel Granted Endowed Professorships

Two members of the F&ES faculty have been granted endowed professorships. Michael Dove, an ecological anthropologist, has been named the Margaret K. Musser Professor of Social Ecology. Thomas Graedel, a pioneer in the nascent academic discipline known as industrial ecology, has been named the Clifton R. Musser Professor of Industrial Ecology.

Professor Dove's recent research, funded by the MacArthur Foundation, examines the wider dimensions of the relationship between society and biodiversity in Southeast Asia. His other areas of research and teaching include the theory of sustainable development and resource use; contemporary and historical environmental relations in South and Southeast Asia; human use of tropical forests and grasslands; resource-based linkage of local communities to global systems; the study of developmental and environmental institutions, discourses and movements; and the sociology of resource-related sciences.

Over the years, Professor Dove's work has led him to Borneo, where he spent two years in a tribal longhouse studying swidden agriculture; to Java, where he was a research adviser studying the formation of government resource policy for six years; and to Pakistan, where he served for four years as an adviser to the nation's forest service on social forestry policies.

He has published approximately 100 academic papers, including over 20 in Indonesian. He holds a joint appointment in the Department of Anthropology and is chair of the Council of Southeast Asia

AT THE School

Of the 115 master's students who enrolled last September, 34 are from 25 countries.



Thomas Graedel

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Michael Dove

© Michael Marsland

Studies, which is part of the Yale Center for International and Area Studies. A graduate of Northwestern University, he holds M.A. and Ph.D. degrees from Stanford. He has been a member of the Yale faculty since 1997 and is a fellow of Calhoun College.

“Professor Dove has been a very successful teacher and advisor, and has been an invaluable role model because of his extensive experience in Asia,” Dean James Gustave Speth said.

Professor Graedel has provided both the perspective and techniques to help industrial operations design processes and manufacture products that minimize the negative impact on the environment in 11 books and over 250 technical papers he has authored or coauthored. These include the textbook, *Industrial Ecology*, first published in 1995 and soon to be released in an expanded second edition; three related books—*Design for the Environment*, *Industrial Ecology and the Automobile*, and *Streamline Life-Cycle Assessment*—and *Atmosphere, Climate and Change*, which won the American Meteorological Society’s Louis J. Battan Author’s Award in 1995. He is co-author of the forthcoming book, *Atmospheric Corrosion*.

His environmental assessment matrix, which he developed for AT&T Bell Laboratories, is now a standard industrial tool for streamlined life cycle assessments of the environmental impacts of products, processes and facilities. Because of his expertise in atmosphere-metal interactions, Professor Graedel served as a consultant to the Statue of Liberty Restoration Project between 1984 and 1986. He also has been an adviser to the government, serving as chair of both the National Research Council Panel on the Atmospheric Effects of Stratospheric Aircraft and the National Research Council Committee on Grand Challenges in Environmental Sciences.

In addition, he will be inducted into the National Academy of Engineers in October, and is a member of the National Science Foundation’s Advisory Committee on Environmental Research and Education, which is defining and prioritizing environmental science research areas for the next two decades. The Yale administration also has asked Professor Graedel to chair the university’s new Advisory Committee on Environmental Management, essentially a first step toward “greening” Yale. A graduate of Washington State University, he holds an M.A. in physics from Kent State University and an M.S. and Ph.D. in astronomy from the University of Michigan. He is a fellow of Pierson College.

“Professor Graedel is a prolific researcher and writer, and has been centrally involved in the establishment of F&ES as one of the world’s foremost centers for industrial ecology,” Dean Speth said.

Nearly 30 Percent of Class of '03 is International

Nearly 30 percent of the class of 2003 of master’s students is international. Of the 115 students who enrolled last September, 34 are from 25 countries, including 7 from Japan, 3 from India and 2 each from Korea and the United Kingdom.

The other countries represented include Argentina, Chile, Colombia, Germany, Ghana, Guatemala, Indonesia, Korea, Nepal, the Netherlands, Nicaragua, Pakistan, the Philippines, Russia, Singapore, Taiwan, Tanzania, Thailand, the Ukraine, Uzbekistan, and Vietnam.

Eighty-two students are pursuing a two-year master’s degree in environmental management, followed by 8 in forestry, 7 each in forestry science and environmental science, and 6 in the one-year environmental management program. The class is comprised of 65 women and 50 men, and the average age is 28.

The preferred advanced study area for the 51 students studying environmental management is environmental policy and management, with 15 focusing on social ecology and community development, 12 on conservation biology, 5 on ecosystem science and management, and 3 on coastal and watershed systems.

AT THE School

“The ESI moves us toward a more analytically rigorous and data-driven approach to environmental decision-making,” says Daniel Esty.

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Fourteen doctoral students enrolled last September, with four coming from Korea, Sri Lanka and Canada. Six are candidates for a doctor of forestry and environmental studies and 8 are enrolled in the Ph.D. program that is offered in conjunction with the university’s Graduate School of Arts of Sciences.

Finland Ranks Highest in Environmental Index; U.S. Lags

New Environmental Performance Study Complements Annual Sustainability Ranking

Finland leads the world in environmental sustainability, according to a 142-nation study released in February at the annual meeting of the World Economic Forum (WEF), held in New York. The study ranks the United States 51st, showing that a nation’s economic status does not always correspond to its Environmental Sustainability Index performance. The United Arab Emirates ranked last.

These results emerge from the most recent update of the ESI, a project conducted jointly by Yale University, Columbia University, and the World Economic Forum.

In addition to the ESI, a pilot Environmental Performance Index (EPI) also was unveiled. While the ESI takes account of environmental “endowments,” current results as well as future capacity to manage environmental challenges, the EPI measures current performance on core environmental issues: air and water pollution, land protection, and greenhouse emissions.

“The ESI permits systematic cross-national environmental comparisons,” says ESI Project Director Daniel Esty of Yale’s Center for Environmental Law and Policy. “Environmental decision making has long been plagued by uncertainties and a lack of critical information. As a result, choices are made on the basis of generalized observations and best guesses, or worse yet, rhetoric or emotion. The ESI moves us toward a more analytically rigorous and data-driven approach to environmental decision-making.”

According to the study, Finland ranks at the top because of its success in minimizing air and water pollution, its high institutional capacity to handle environmental problems, and its comparatively low levels of greenhouse gas emissions.

The United States performance is uneven. The U.S. lags in controlling greenhouse gas emissions that contribute to climate change and under-performs its peers in reducing waste. Yet the United States stands at the forefront of the world in controlling water pollution and promoting robust environmental policy debates.

The ESI provides a basis for addressing a number of pressing policy questions, such as: does good environmental performance come at a price in terms of economic success? The ESI suggests not. Finland and Belgium, for example, have similar GDP per capita, but are ranked widely apart by the ESI. Finland has a \$22,008 GDP per capita and a 73.7 score, while Belgium has a GDP of \$24,533 per capita and scores 38.6.

“The ESI shows that a nation’s economic status does not necessarily predict its environmental success,” says Marc Levy of Columbia University’s Center for International Earth Science Information Network (CIESIN), a unit of the Columbia Earth Institute, and a contributor to the study.

“Comparative analysis allows us to understand where conditions are improving and where they are deteriorating, which policies are working and which are not, and where ‘best practices’ might be found,” says Yale’s Esty.

The study’s findings were based on calculations of 20 key indicators in five categories:

- environmental systems,
- environmental stresses,
- human vulnerability to environmental risks,

AT THE School

The EPI measures performance on core environmental issues.

- a society's institutional capacity to respond to environmental threats, and
- a nation's stewardship of the shared resources of the global commons.

Among the 20 indicators that comprise the ESI are factors such as urban air quality, water, and the strength of environmental regulation. The study builds on 68 underlying databases, representing the most comprehensive publicly available collection of environmental indicators in existence. Creating accessible, interdisciplinary databases for earth science research is a CIESIN specialty.

Just as the Gross Domestic Product (GDP) provides a broad-gauge indicator of economic success, the ESI distills a country's capacity for sustained environmental strength into a single number ranging from 0 to 100. Much like a cumulative grade point average for the environment, this number provides a comprehensive snapshot of a country's likely environmental quality of life over the next generation or two.

"No country is above average in each of the 20 indicators, nor is any country below average in all 20," notes Peter Cornelius of the World Economic Forum's Global Leaders for Tomorrow Environment Task Force. "Every country has room for improvement. No country can be said to be on a truly sustainable environmental path."

New Environmental Performance Index

As Columbia's Levy explains, "the ESI combines measures of current conditions, pressures on those conditions, human impacts, and social responses, because these factors collectively constitute the best way to gauge the prospects for long-term environmental sustainability."

To assist in measuring current environmental performance, a parallel Environmental Performance Index (EPI) was created. The EPI ranks countries according to their present air and water quality, land protection, and climate change prevention results.

"The EPI allows us to zero in precisely on efforts to manage environmental problems," says Kim Samuel-Johnson, director of the WEF Global Leaders for Tomorrow Environment Task Force. "This index measures things for which a government can clearly be held accountable. It shows how business-like emphasis on performance measurement can improve environmental results."

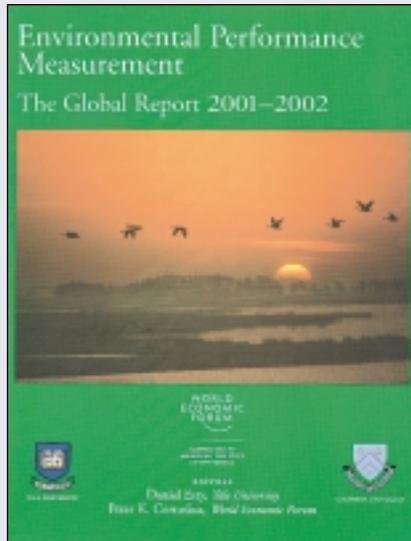
Gregoire Elected Regional President of International Biometric Society

Timothy Gregoire, J.P. Weyerhaeuser, Jr. Professor of Forest Management, has been elected president of the Eastern North American Region (ENAR) of the 6,000-member International Biometric Society. He will serve as president-elect this year, and as president in 2003 next year. He is the first person from Yale ever to be elected to ENAR's highest post. In addition, he is in the last year of a two-year term as treasurer, and chaired the Regional Advisory Board from 1995 to 1998. Founded more than 50 years ago, the International Biometric Society promotes biological science through the development of quantitative theories and the application, development and dissemination of effective mathematical and statistical techniques. The society publishes the journals *Biometrics* and the *Journal of Agricultural, Biological and Environmental Statistics*. Professor Gregoire serves on the Editorial Advisory Committee for both publications, and serves on the Council of the International Biometric Society, which is the policy-making body for the organization.



Timothy Gregoire

BookShelf

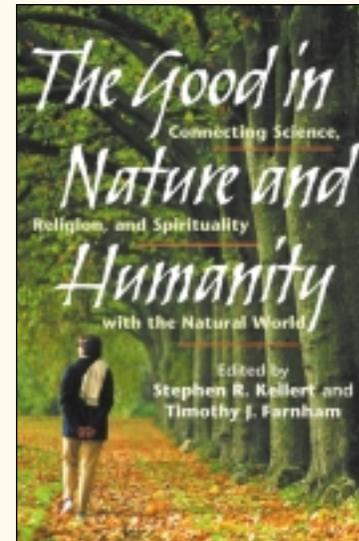


Bringing Analytic Rigor to Environmental Decision-Making

Environmental decision-making has long been plagued by uncertainties and a lack of critical information. The data and analyses needed for thoughtful and systematic action to minimize pollution harms and to optimize the use of natural resources are often unavailable or seem too costly to obtain. As a result, choices are made on the basis of generalized observations and best guesses, or worse yet, rhetoric or emotion.

Environmental Performance Measurement: The Global Report 2001-2002 presents a new approach to environmental decision-making based on facts and analytic rigor. It collects in one place the largest amount of environmental data that has ever been assembled. Presented here is the first serious attempt not only to measure environmental sustainability in one summary indicator, but also to rank 122 countries on the basis of this index. In addition, country profiles provide detailed information about the environmental performance of these countries across 22 critical environmental indicators. Written by both academics and practitioners, this report is an essential tool for environmental decision-making.

Contributors to the report include Daniel Esty, professor of environmental law and policy at Yale; Peter Cornelius, director of the Global Competitiveness Program at the World Economic Forum; Frank Dixon, managing director of research and development at Innovest Strategic Value Advisors; Alois Flatz, head of research at Sustainable Asset Management in Zurich; Marc Levy, associate director for science applications at the Center for International Earth Science Information Network in the Columbia University Earth Institute; Mondher Mimouni, a market analyst with the International Trade Center, UNCTAD/WTO; Michael Porter, the Bishop William Lawrence University Professor at Harvard University; Forest Reinhardt, a professor at the Harvard Business School; and Friedrich von Kirchbach, chief of the Market Analysis Section in the Geneva-based International Trade Center, United Nations Conference On Trade and Development /World Trade Organization.



Tying Spirituality to Environment Necessary to Preventing Environmental Decline

Strengthening the bonds between spirituality, science and the natural world is necessary to prevent further environmental decline, according to a newly published book edited by Stephen Kellert, Tweedy/Ordway Professor of Social Ecology at the School of Forestry & Environmental Studies.

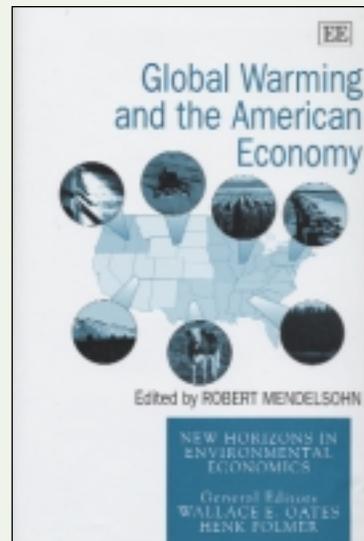
The 277-page book, *The Good in Nature and Humanity: Connecting Science, Religion and Spirituality with the Natural World*, features 20 leading thinkers and writers, including Ursula Goodenough, Lynn Margulis, Calvin DeWitt, Carl Safina, Wendell Berry, Terry Tempest Williams, Barry Lopez, and others. They examine the divide between faith and reason, and seek a means for developing an environmental ethic that will help society reconcile the related problems of global environmental destruction and an impoverished spirituality.

“Scientists, theologians and the spiritually inclined, as well as all those concerned with humanity’s increasingly widespread environmental impact, are beginning to recognize that our ongoing abuse of the earth diminishes our moral as well as our material condition,” Professor Kellert says in the preface of the book, which is published by Island Press.

The book was inspired by a conference at Yale in May 2000 and is co-edited by F&ES doctoral candidate Timothy Farnham. It asserts that science and religion cannot by themselves reverse environmental and moral decline. The contributors explore ways in which science, spirit, and religion can guide the experience and understanding of our ongoing relationship with the natural world and examine how the integration of science and spirituality can equip us to make wiser choices in using and managing the natural environment.

Professor Kellert’s work has focused on the connection between human and natural systems with a particular concern for the conservation of biological diversity and designing ways to harmonize the natural and human built environment.

BookShelf



Global Warming Will Have Mild Impact on United States

He has authored more than 100 publications, including several books that explore people's relationship to nature. In 1993, he co-edited *The Biophilia Hypothesis* with Edward O. Wilson, an entomologist at Harvard. The book brought together 20 scientists from various disciplines to refine and examine the idea of biophilia, which suggests that humans possess a deep and biologically based urge to connect with the natural world.

He went on to publish *The Value of Life: Biological Diversity and Human Society* (1996), and *Kinship to Mastery: Biophilia in Human Evolution and Development* (1997).

He is editing another book, *Children and Nature: Theoretical, Conceptual and Empirical Foundations*, to be published by MIT Press in June. The authors examine the evolutionary significance of nature during childhood; the formation of children's conceptions, values and sympathies toward the natural world; how contact with nature affects children's physical and mental development; and the educational and political consequences of a weakened childhood experience of nature in modern society. He is working on a new book, *Ordinary Nature: the Role and Design of Natural Diversity in Everyday Life*, to be published by the University of California Press.

A newly published book on global warming says that although there are some harmful effects from warming, the impact on the United States is likely to be mildly beneficial for all but the most severe climate scenarios.

In *Global Warming and the American Economy* (Edward Elgar Publishing), editor Robert Mendelsohn, Edwin W. Davis Professor of Forest Policy at the School of Forestry & Environmental Studies, says that the largest impact will be to agriculture. Because plants flourish in a carbon dioxide-enriched world, crops are likely to do better in the United States under most warming scenarios, and especially in the North where agricultural productivity would increase.

Another sector that would benefit from warming is forestry. Ecologists predict that a warmer, wetter world will generally increase forest productivity per acre. In addition, more productive southern species will be able to migrate out of the Southeast into the Mid-Atlantic and South Central states. These increases in highly productive timberlands will increase the supply of timber in the United States, encouraging lower timber prices.

However, not all areas of the country will benefit. The oceans are expected to expand, causing sea levels to rise and potential floods in coastal areas. Society will be forced to decide whether to retreat as the seas rise or to protect the coastline.

The 209-page book quantifies damages only in the United States. However, the effects of climate change in the United States have implications for other countries. The national results suggest that most of the countries responsible for greenhouse gas emissions, the rich temperate countries of the world, are likely to benefit from warming. The results in the American South, however, suggest that the hotter poorer tropical countries of the world are likely to be harmed. Adding these benefits and damages, the net impact of warming on the world is likely to be small.

The study does not quantify all the impacts from warming. Impacts from the loss of endangered species, the poleward shift in ecosystems, and health effects have not yet been quantified. Large damages in these areas could justify stringent control programs but scientists have not yet been able to find them. Until that dramatic story can be found, Professor Mendelsohn says the impacts from global warming do not justify an expensive abatement program.

The United States should, however, address the inequity of global warming, including consideration of a development package for all poor tropical countries both as compensation and as a coping strategy for them in the long run.

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2. Becoming a superpower with humility. In a thoughtful piece in the *New York Times*, reporter John Burns wrote from Islamabad that “America, with its daunting economic, political and military power, its pervasive popular culture, and its instinct to spread the freewheeling, secularist ways of American life—even to those who may prefer to shun them—has an impact on people’s lives to the farthest corners of the Earth. Just how great this impact is, and how, in many places, it is resented, may be more than many Americans can grasp.... To be free, rich and powerful in a world that is mostly none of these things is, inevitably, to engender resentments. Freedom itself can be considered deeply disturbing in many of the world’s poorer societies that are anchored to the old pillars of faith, tradition and submission.”

There is much that can be done in the face of this reality. We can find a hundred ways—in government, in business and in our personal contacts—to show our respect for other cultures, especially Islamic ones; we can take seriously claims that economic globalization is proceeding too fast and without regard to local communities or social and cultural values; and we can conduct ourselves in all spheres with less arrogance and more humility and with new interest in non-economic values and objectives.

3. Reconsidering U.S. foreign policy. A major source of Arab-Islamic animosity toward the U.S. is a reinforcing set of specific policies that could be reassessed: a seeming insensitivity to the Palestinian perspective, uncritical support of autocratic Arab governments, the stationing of U.S. troops in Saudi Arabia, and the U.S.-sponsored economic sanctions against Iraq. Might the U.S. review these issues to see if a new balance can be found which addresses the offending policies while still protecting essential U.S. interests, including our commitment to the security of Israel?

4. Conducting a dialogue on Islam and with Islamic governments. Terrorists exist in America, East Asia, Europe and, indeed, almost everywhere, but radical Islam obviously poses a special challenge. A two-pronged effort at dialogue is needed. In one, responsible Islamic leaders and people of good will everywhere should seek to isolate and delegitimize those who would cynically pervert Islam to justify and motivate terrorist behavior. As *New York Times* columnist Thomas Friedman has noted, there is a civil war within Islam between the modernists and the medievalists. We should do everything possible to strengthen the hand of the former.

In the other dialogue, we could challenge the governments of the Arab states and predominantly Islamic countries to move to greater openness and democracy and to opt for greater investments in the human development of their own people. We can support these goals with real assistance, as indicated below.

5. Rediscovering the United Nations. Could September 11 recharge U.S. support for the United Nations? The success of our increasingly

interconnected world depends critically on a strong and vital United Nations. The U.N. is the world’s conscience as well as its peacekeeper. It gives the global leadership on population, environment and development. The U.N. can help give globalization a human face. When it comes to terrorism, the U.N. could assist greatly in “dealing with the tinder as well as the flint,” as the World Resources Institute’s Jonathan Lash has put it.

Having led in its creation, the U.S. now treats the U.N. with neglect and sometimes disdain. It has made the U.N. the whipping boy for failed international ventures, has refused to pay its dues, has walked away from its efforts to find international agreement on a score of major issues, and has contributed miserly to its anti-poverty, population and environmental programs.

President Bush campaigned against “nation building,” but something closely akin to that is what is needed in Afghanistan, Somalia, and elsewhere. And in Afghanistan today, it is the U.N. that is leading this process.

6. Finding the environment. It is commonplace and, unfortunately, appropriate to decry the Bush Administration’s poor record on the environment. Web sites compile growing lists of its misdeeds. Yet September 11 has opened several doors that could lead the Administration to a new approach. It is hard to seek global cooperation on our issues without cooperating with others on their priorities, and, right now, the environment is a top priority in Europe and a growing concern in the developing world. Concern about further terrorism has forced us to look again at what Amory Lovins has called our “brittle” energy supply, at toxic and radioactive materials, and at highly centralized and vulnerable systems. For a public now-increasingly concerned about violence, it is not a big step to violence against nature. For those concerned not only with national security but with human security, environmental risks should loom large.

Most of all, there is the prospect that September 11 may have brought about the beginning of certain cultural changes we will do well to note and nurture. Ground zero has been the epicenter for more than destruction and great personal loss. Compassion and generosity also flowered there. A great many Americans have lowered personal barriers, reached out to friends and to strangers, and found something deeper to consider and to share. People have looked again at their values and priorities. Some are not as interested in material things, or in “getting back to normal.” Some are avoiding flying not out of fear but because they want to stay close to home and family.

One of our students, Maria Ivanova, noted recently that if the “traditional economic cure of consumption frenzy” won’t work in the current recession, government should fill the need by investing in our starved public sector—in schools, in health care, in environmental restoration, in public transportation, and in other public needs.

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7. Forging a new energy policy. Might September 11 lead to a new U.S. energy policy? America consumes 25 percent of the world's oil, but we have only 3 percent of known reserves. We import more than half of our oil from some of the most unstable regions of the world. September 11 brought home the danger in turning a blind eye to oil dependence.

Sixty-five percent of the world's known reserves lie beneath the Persian Gulf states. If we do not act, the share of our oil that is imported will grow from one-half to nearly two-thirds by 2020. While oil prices are down for the moment, Middle East instability makes for a situation that could change at any moment. New supplies such as Russia and the Caspian region are hardly more sound.

Middle Eastern oil has led us to accept unacceptable Saudi Arabian behavior and has contributed to stationing U.S. troops there; both have fed hostility towards the U.S.

Is it possible that the U.S. public will be educated again on energy issues and that, this time, a working consensus will evolve in favor of an all-out U.S. commitment to energy efficiency and renewables based on the exciting new technologies now available?

8. Committing to international development. Beyond our positive stake in the economic health of the developing world, Americans have a large stake in what we might call the "prevention agenda"—the avoidance of terrorism, humanitarian emergencies, national and regional conflicts, environmental deterioration, illicit drugs, the spread of diseases, illegal migration, and other human and "natural" disasters. We now see plainly that these problems do not need passports to travel around the globe.

Many of these threats stem directly or indirectly from poverty, inequity, joblessness and social disintegration. No one would attribute such problems solely to under-development, but under-development is surely part of the disease. And development—sustainable, people-centered development—will almost always be a part of any cure.

The case for seeing development as a strategic priority for the U.S. is strong indeed. Unfortunately, we have tended to walk away from this challenge. In 1956, 63 percent of all development assistance came from the United States. Last year it was down to 13 percent. When you compare the percentage of gross domestic product devoted to development assistance among the other industrialized countries, the U.S. ranks dead last. Economist Jeffrey Sachs has put it well: "America has wanted global leadership on the cheap."

Development assistance is obviously a priority in Afghanistan. More generally, a focus on the roots of terrorism and instability in the world could emerge, and that should lead to a deeper concern for U.S. support for both democracy and sustainable, people-centered development in the poorer countries.

Hopelessness can be overcome, for example, by measures that invest in the United Nations' Millennium Goals, which seek major improvements in global health and education and access of the world's poor to assets

that can empower them economically, socially and politically. Eliminating mass poverty in the lifetimes of today's undergraduates is an achievable objective. Even if we don't fully succeed, a major U.S. commitment here would make plain our willingness to deal compassionately and generously with widespread human deprivation.

Enhancing the standing of women is a key development objective. The terrible subjugation of Afghan women under the Taliban has reminded us that, though this was an extreme case, women throughout much of the world are deprived of the rights and opportunities available to men. The linkages among gender equality, environmental management, and successful grass-roots development are well known to both villagers and development experts.

Much of what we were hoping for back in late September points towards a different role for America in the world. The caring and generosity and selflessness so evident in America in the wake of September's attacks must not be confined to the homefront but must be extended abroad. Somehow out of all the sorrow and loss should come discovery of a new national role—one that seeks the great things for which our country has always stood—democracy, opportunity, equality before the law—not only for ourselves but for all the world's citizens.

There are some signs of movement on this complex agenda. The U.S. is paying more respect to the U.N. and is supporting some rehabilitation and reconstruction in Afghanistan. Though the Administration has rejected an international push to double development assistance for the poor, it has promised to increase U.S. development aid. September 11 does seem to have added positive momentum to development cooperation. The Administration has at least verbally acknowledged that climate change is a serious issue. Its recently announced climate policy, however, would allow a large increase in greenhouse gas emissions, not the reduction sought by the international community. There is a movement in the Senate for an energy package very different from the one put forward by Vice President Cheney, though the Administration is sticking with the old. There is certainly heightened public interest in international affairs, and many have made a special effort to learn more about the Islamic world. But, truth be told, we have seen only very modest progress in these eight areas. In these areas, September 11 does not yet appear to have been the day everything changed, but it is certainly not too late to try to make things happen.

March 29, 2002

Certified! Yale-Myers Forest Passes Inspection by Accreditors

By John Courtmanche

Yale-Myers Forest was awarded certification by two internationally recognized accrediting agencies after an audit last fall determined that the school's management of the 7,840-acre tract is exemplary.

The audits were conducted by Scientific Certification Systems of Oakland, Calif., which is accredited by the Forest Stewardship Council (FSC), an international, non-profit organization that promotes sustainable forestry, and Andersen/InterForest of Branford, Conn., a consulting company licensed to do third-party verification under the Sustainable Forestry Initiative (SFI) system, a program of the American Forest and Paper Association.

David Wager, director of forest management certification for Scientific Certification Systems, said, "It is extremely rare for an evaluation team to recommend certification without conditions, as was the case for Yale."

The FSC evaluation team found numerous strengths of Yale's forest management, including:

- The sustainable harvest program is supported by an up-to-date timber inventory based on a long-term program of Continuous

Forestry Inventory plots (established in 1956 and re-measured in 1967, 1976, 1984, and 1993) and by stand exams every 7 years.

- Timber stands on the Yale-Myers forest are consistently well stocked with excellent-quality growing stock. Yale's foresters have a clearly demonstrable record of tending stands to maintain health and vigor.

- Forest managers work closely with the logging contractor to develop markets and improve wood utilization.

- Staff includes internationally recognized experts in stand dynamics who understand the ecological importance of stand structure.

- Yale practices restoration and stewardship of a forest previously degraded by agriculture.

- Yale is exemplary in paying careful attention to soil productivity, wetlands, streams, and riparian areas.

- Forestry operations are managed in a fiscally conservative manner.

- Forest management staff have excellent relationships with graduate students and outside contractors who work on the forest.

Mike Ferrucci, the lead auditor for SFI, said, "Our SFI audit team was quite impressed with the quality and condition of the Yale-Myers Forest. The results of sound practices employed by generations of Yale foresters, both faculty and student-managers, are clearly visible within this landscape of hillside forest and bottomland wetlands. We also noted the degree to which students are involved in hands-on management and research here, which we think aligns well with the role of the forest as a core part of Yale's educational and scientific research missions."

Ferrucci said that the verification team found that Yale's SFI program conforms with the American Forest & Paper Association's Sustainable Forestry Initiative Standard, 2001 Edition (SFIS), as of last



Doctoral student David Ellum, School Forest Manager Alex Finkral and Tom Bernier, a local timber harvesting contractor, discuss plans for a recent 60-acre timber sale.



Mark Ashton, professor of silviculture and forest ecology

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“It is extremely rare for an evaluation team to recommend certification without conditions, as was the case for Yale,” said David Wager of SCS.

Oct. 31, and that all relevant performance measures and objectives are being met. “Yale’s program exceeds the SFI Standard in the protection and management of special sites, in the protection of water quality, and in managing visual impacts of harvesting and other forest operations,” he said.

He said this conclusion was supported by Yale’s meeting all of its SFI Indicators and by several key observations and findings, including:

- The current condition of the forest reflects 70 years of conservative silvicultural activities that demonstrate a sustained commitment to management in concert with natural stand development processes and pathways while striving constantly to learn from the results of past actions, apply lessons learned in other locations, and impart knowledge to any interested party.

- Extensive documentation of forest management policies, plans, past management activities, and research results.

- Baseline appreciation by the forest management staff of the need to manage the land base for a mixture of ecological values, educational activities, research opportunities, and financial return.

- Demonstrated in-depth knowledge and expertise by Yale’s current staff of the critical operational, social, and environmental issues affecting this forest holding.

Michael Washburn, research scholar and director of the school’s forest certification program, said, “Given Yale’s long tradition of working to strengthen the practice of forest management, we believe we manage our forest well. From one perspective, the certification process tested us. People may ask, ‘Why did we need third-party review? We know we’re doing it well.’ But why not test them? If ours didn’t pass, we were prepared to look pretty hard at the process and standards.”

This confidence may be based on the fact that Yale’s school forests are managed not so much as sources of profit but as “working” forests—as a demonstration that forests can be managed for goods and services (especially timber) in a way that does not compromise the long-term health of the forest. Research and education are a fundamental goal of Yale’s school forests. Mark Ashton, director of school forests and professor of silviculture and forest ecology, points out that stewardship for

natural resources was the reason the school was founded and permeates “just about everything the school does;” the school’s participation in the forest certification process allows faculty, students and others to learn how certifiers measure stewardship.

The Yale School of Forestry & Environmental Studies owns and manages 10,880 acres of forestland in Connecticut, New Hampshire and Vermont. Yale-Myers Forest is located in northeastern Connecticut, is the school’s largest parcel at 7,840 acres and its most active in terms of education, research and harvesting operations. The forest is comprised mainly of mixed hardwoods with a large component of hemlock, several scattered white pine stands and occasional red pine plantations, as well as of numerous small ponds and wetland areas. Yale-Myers produces roughly 500 million board feet of timber annually, yielding annual income of approximately \$75,000, which covers administrative costs and the cost of part-time management staff comprised of faculty and students.

Starting last summer and continuing into last October, the school forest staff prepared and supplied the auditors with hundreds of pages of documentation describing Yale’s forest management policies, procedures and practices. In short, the management goals of the school forests are to provide: a hands-on, working

forest laboratory for teaching; a permanent, fully owned site for short- and long-term research; and a financially sustainable asset of the school while maintaining the overall integrity and health of the forest ecosystem. The school forests strive to achieve these goals within the context of sound, defensible land stewardship.

In late October, the two auditors visited the school for a day to interview forest management staff.



School Forest Manager Alex Finkral counts the rings on a piece of a tree’s stem that was extracted by an instrument called an increment core. Counting the rings and examining their size determines a tree’s age and radial growth rate, and is an important part of dendrochronological research. Such research is used in examining disturbance history, climate change trends, and growth responses to silvicultural treatments.

Certified! Yale-Myers Forest Passes Inspection

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Alex Finkral and David Ellum conduct a routine inspection.

Students who assisted in preparing and supplying information to the auditors included John McKenna, who obtained a master's degree from F&ES and was hired to oversee the audits; Alex Finkral, a doctoral student and forest manager; Mike DeBonis, assistant forest manager; doctoral students Alexander Evans (mapping, GIS, and inventory specialist) and David Ellum (research and demonstration specialist); and Michael Sterner, a recent F&ES graduate and former assistant forest manager. Washburn said that Professor Ashton and the students prepared maps and data, making the information that's used in management decisions more user-friendly for the certifiers. Each audit required a written response to specify how Yale-Myers meets various criteria; in some cases this required a direct response,

while in others it meant citing where these criteria were addressed in established documentation. The students also helped answer auditors' questions about how the forest has been managed the past couple years.

Then during the last week of October, the auditors spent three days conducting field reviews in the forest. McKenna explained that during the field assessments, the auditors inspected timber sales from the past two to three years, as well as those marked for sale in the near future. "They wanted to see how we had laid everything out, that any tree to be harvested is painted and tallied. They looked at what we're trying to achieve, what wood is coming out and is going to sale, and most important, what is left behind to regenerate or continue growing. They were looking at how our roads and skid trails are laid out to ensure they're not causing erosion or affecting wildlife. With the documentation they see it on paper, but out in the field they can see it in practice."

Auditors also surveyed people at the school and in the community surrounding the forest to determine how the school's management record is viewed by concerned constituents. Washburn said one important question for both auditors was whether the actual management practices matched the written plans.

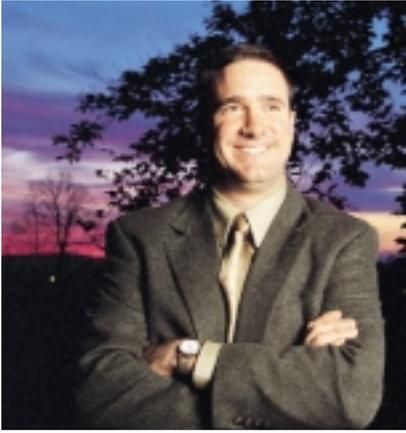
A unique attribute of the Yale-Myers certification audit was that the two certifiers representing FSC and SFI worked together, which is a rare occurrence. For the FSC assessment, the FSC-sanctioned auditor was assisted by the SFI-approved auditor, and the men switched roles for the SFI verification. McKenna said one advantage to the dual audit was the SFI auditor came from a commercial forestry background while the FSC auditor came from a wildlife ecology background, so their respective areas of expertise were complementary and "they could answer each other's questions."

Yale requested this joint audit for reasons of non-partisanship and optimal conditions for analysis and comparison. Washburn explained that the FSC system focuses on management performance against a set of standards, including review of timber management, biodiversity, economics, and social aspects. The SFI system relies more heavily on reviewing management policies and procedures, and leaves social concerns to public authorities in the given region—for example, labor laws and the U.S. Occupational Safety and Health Administration. He says another difference is that FSC sets forth pre-set standards, while SFI lays down some core



Doctoral student David Ellum measures the height and diameter of a dead tree, called a snag. Snags and other coarse, woody debris are often included in the forest inventories conducted at the Yale-Myers Forest. Timber volume, species composition and regeneration are integral parts of the school's management system, which certifiers recently evaluated during their audits of Yale-Myers.

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Michael Washburn, director of the Program on Forest Certification

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indicators but leaves more discretion to the forest managers.

Those at F&ES participating in the certification audits hope this process will give people the opportunity to talk about what is meant by sustainability. By Washburn's definition, sustainability is a set of conditions in which a forest is maintained to include a natural mix of plant and animal species, while forest management activities remain economically viable and socially acceptable. The audit of Yale-Myers is also an opportunity to learn about certification as a tool to measure sustainability. Washburn believes many people in Yale's F&ES community are not familiar with certification and how it works. "Having certification happen close to home, and having documents available for people who are interested, we can better inform our community of interest, including stakeholders and partners," he said.

The F&ES certification participants are already constructively critical of at least one aspect of certification: the cost. In the school's case, the forest management staff paid for the audits with the support of Ms. Enid Storm-Dwyer and the Overhills Foundation. Washburn explained, "Certification can range from a couple cents per acre to a couple dollars per acre. It's safe to say it would be difficult for our research forests to have absorbed the cost of both of these certifications given our annual operating budget."

Professor Ashton said there isn't any financial benefit to certifying Yale-Myers. "From the whole school perspective, it's an advertisement that we practice good forestry," he said. "I am unsure of what benefits certification will bring regarding the school. They might well be support for research, but it will likely not benefit the actual school forest directly."

While Yale forests are unique in that their principle mission is the delivery of education and research, other forest owners have different motivations for engaging in a certification program. Some stand to benefit financially from participating in a certification program. Benjamin Cashore, assistant professor of sustainable forest management, and Washburn are conducting other research that explores these issues, and looks at the extent to which certification is changing the way in which forests are managed. They co-teach a class that addresses domestic and international issues of certification, and highlights the emergence of certification as a form of private rule-making. Certification is intended to provide market incentives to foster better stewardship of forests around the world. Its success in this regard is still unproven.

The forest management staff was particularly aware of what the high cost of certification might mean for a private forest. Professor Ashton stated simply, "No small private landowner could afford such an operation." John McKenna elaborated, saying, "Small forest owners trying to manage their land sustainably may not be able to participate due to the economics of their management or the cost of the certification. There is probably a lot of people involved in forests who are not able to participate in the process. Hopefully that will change, but it's important to recognize this whole initiative of certification is still fairly young. I'm not sure how much economic benefit certified forests are seeing yet. That may change in the future as more become certified and we see more of a market and economic incentive to do it."

Most importantly, Washburn said, is that certification enables professionals and interested citizens to have a more sophisticated dialogue about what is sustainable, and lets consumers play a role in favoring companies that practice sustainable management.



To prepare for the timber harvest, Tom Bernier operates a machine that grips a tree with a vice-like arm, strips trees of their limbs, cuts timber to merchantable length, and neatly deposits the debris on the forest floor.

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Doctoral Student Awarded Prestigious Anthropology Prize



Anne Rademacher

“Rademacher’s dissertation promises to be a pioneering contribution to the human ecology of cities in developing countries and the social construction of ecological restoration,” Professor Michael Dove.

Focus of Study is Interplay of Culture and Ecology in Katmandu

By John Courtmanche

F&ES doctoral student Anne Rademacher has been awarded the prestigious Roy A. Rappaport Prize 2001 from the American Anthropological Association (AAA) for her work studying the impact of cultural politics on river restoration projects in Katmandu, Nepal. The prize recognizes “exemplary ecological/environmental scholarship by anthropology graduate students,” and was awarded in absentia at the association’s annual meeting in Washington D.C. in November.

Rademacher is a joint doctoral student in Yale’s graduate environmental studies and anthropology programs and holder of an M.E.S. degree from the School of Forestry & Environmental Studies. She received the prize for her pre-dissertation paper entitled, “Past, Present, and Future Ecologies: Constructing Degradation and Restoration on the Bagmati and Bishnumati Rivers in Katmandu.” The prize supports Rademacher’s work not only by giving it broader visibility in the field, but also by providing \$500 toward her research. In addition, her work has been supported by a three-year, U.S. Environmental Protection Agency “Science To Achieve Results” (STAR) grant.

Working toward her dissertation, Rademacher has spent much of the current academic year conducting fieldwork in Nepal. She is working to trace the different ways stakeholders characterize the environmental health of the Bagmati and Bishnumati rivers, and the city of Katmandu.

“I am interested in the ideas and practice of ecological restoration, especially as they apply to cities,” she explains. “I am also interested in the contribution the social sciences can make toward understanding how and why environmental initiatives play out the way they do. I am very encouraged by this award. There is always a danger of losing touch with others when one is engaged in doctoral research; this award indicates to me that my work is meaningful to people outside of my particular regional and topical focus.”

Despite Focus and Aid, Rivers are Deteriorating

The Bagmati and Bishnumati Rivers, which converge in the Teku neighborhood of Katmandu and continue as the Bagmati River, are widely characterized as severely degraded, Rademacher explains, and for years they’ve been the focus of restoration initiatives.

In her paper, Rademacher reports that many interested parties believe ecological deterioration of the rivers has dramatically accelerated over the past 10 years, a time of unprecedented urban growth. Specifically, she says the rivers suffer from reduced water quality and changed physical dimensions. Studies have identified the main causes of pollution as the discharge of untreated sewage and widespread dumping of solid waste into the rivers and on their banks. Studies also cite excessive sand mining in riverbeds and banks, which supplies mortar and cement materials to the city’s construction industry, as the blame for significant morphological change and severely channeled flow patterns.

In addition, human encroachment on the banks, floodplains and riverbeds has been identified as contributing to degradation. The city does not offer sufficient affordable housing, so increasing numbers of new migrants and poorer city residents have settled in illegal sukumbaasi (landless migrant) settlements along the rivers. Rademacher notes that a significant percentage of the urban riparian corridor is now lined with hovels occupied by settlers claiming rights to the land they occupy.

The rivers also hold tremendous cultural and religious significance, Rademacher says, because they are lined with Hindu and Buddhist temple complexes and ghats, which are river landings for ritual bathing. Some claim river degradation has impacted this ritual activity on the riverbanks.

“Water that previously flowed beside temples, stone ghats, and walkways now flows over 20 feet away from ghat-temple edges, a condition cited among cultural heritage advocates and others as a deeply significant form of cultural degradation,” Rademacher notes.

She believes one fundamental feature of the conflict she is studying is who gets to define what the “urban ecosystem” in Katmandu should look like. The Katmandu population is increasingly diverse, ethnically, religiously, and culturally; for this reason, Rademacher believes the people involved in restoring the rivers need to examine the society’s culture, history and politics.

“The rivers I am studying have profound cultural significance for a certain segment of the Katmandu Valley population, while for others the rivers’ significance is oriented more toward questions of aesthetics, public health, and other issues,” she says. “In this kind of regional context, a river restoration plan conceived and designed from afar, and then applied largely by outside ‘experts,’ is bound to stir all kinds of conflict that development planners did not and could not foresee.”

To cite another link between culture and ecology, Rademacher points out that in the Nepali language, there are several different linguistic terms to describe “clean” water—it can be ritually pure, but not at all “clean” by World Health Organization standards; it can be perfectly potable and not ritually “clean.” “When you embed environmental objectives in internationally-planned, -sanctioned, and -sponsored development projects, you are packaging environmental improvement in ways that

are profoundly political and that have their own cultural attributes attached,” Rademacher said. “There can be, and often are, points where the culture of an environmental management project clashes with cultures of nature in place ‘on the ground.’”

Rademacher believes these are the kinds of conflicts scientists must study, understand, and prevent if society is to think about ecology and ecological improvement as participatory, sustainable endeavors. She adds that these conflicts are also critical to society’s understanding of how and when it is appropriate to think of ecology on a “global” scale. “It is shocking to review the recent history of so-called river restoration projects on the Bagmati and Bishnumati: literally billions of rupees, nearly all derived from international development agencies, have been spent on the goal of restoration, but the rivers are as degraded as ever. There is plenty of data and literally

stacks of fine scientific reports about these rivers. Yet they remain severely degraded, and the active focus of many local initiatives and conflicts.”

College Trip Leads to Decade of Study

The initial inspiration for this work began when Rademacher first traveled to Nepal a decade ago while earning her bachelor’s degree at Carleton College. After graduation she was awarded a Thomas J. Watson fellowship to spend a year studying Nepal’s democratic transition and first round of free elections since the 1950s.

When she entered the master’s program at F&ES a few years later, she decided to devote her work to Nepal. She has returned to Nepal four times between 1997 and 2002 to conduct research. She has been staying with the same Nepali host family since she first visited the Katmandu Valley in 1990. “Being cared for by Nepali friends and family, I feel a responsibility to devote my energy to giving something to them in return,” she says. “Ideally, my research will produce something useful to the people of the valley as well as the students in my research community back at Yale.”

A five-member doctoral committee advising Rademacher is co-chaired by Michael Dove, Margaret K. Musser Professor of Social Ecology at F&ES, and Helen F. Siu, professor of anthropology.

Professor Dove says Rademacher’s doctoral research is spurred by her observation that in Nepal as elsewhere, debates about ecology are often debates about culture as well. “Rademacher’s dissertation promises to be a pioneering contribution to the human ecology of cities in developing countries and the social construction of ecological restoration,” he says.



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Forest Certification

Seen Supplanting Government Jurisdiction

“If forest certification takes off, it’ll be a new form of governance...”
Professor Benjamin Cashore.

By John Courtmanche

Changes in global governance may result in the United States undergoing “the most significant transformation in forest policy governance in the past 50 years,” says says political scientist Benjamin Cashore, assistant professor of sustainable forest policy and a political scientist, who is working to conduct objective analysis of the transformation.

Professor Cashore is comparing emerging international and domestic private governance systems, particularly forest certification eco-labeling programs. His multi-country comparative project includes the United States forest sector, where two forest certification programs are competing for dominance: the international Forest Stewardship Council (FSC), created with the support of leading environmental groups, and the Sustainable Forestry Initiative (SFI), created by the American Forest & Paper Association. “Depending on what happens, the impact could rival the U.S. environmental legislation of the 1960s,” Professor Cashore said. “If forest certification takes off, it’ll be a new form of governance that could actually shift policy-making authority away from traditional governmental authority.”

In a new paper entitled “Legitimacy and the Privatization of Environmental Governance,” Professor Cashore notes what he deems a startling new phenomenon, both in the U.S. and abroad, in the form of “the emergence of domestic and transnational private governance systems which derive their policy-making authority not from the state, but from the manipulation of global markets and attention to consumer preferences.” Consumer preferences in the forest sector take the form of shoppers for lumber or wood products who may prefer to buy those products which are certified as having come from a responsibly managed forest.

In forestry, the emergence of these certification programs is commonly traced back to the U.N. Conference on Environment and Development in Rio de Janeiro in 1992, which failed to adopt a binding forest convention. As a result, a number of major non-governmental organizations (NGOs)

joined together in 1993 to produce the Forest Stewardship Council. Professor Cashore explains, “This certification program was used to give a carrot to companies who practice forest management according to its rules, rather than simply relying on the stick approach of traditional boycott campaigns. The result has been a transformation in how environmental groups promote their goals.”

Professor Cashore’s research has revealed that in every country he has studied where the FSC has entered the domestic policy-making arena, a rival certification program has been created by a forest industry association or landowner association. The reason? “FSC has brought in a widened scope for certification, incorporating social issues and broadened environmental issues,” he said. “They don’t let business have the majority vote.” FSC policies are established by a three-chamber general assembly representing environmental, social and economic organizations. The economic chamber is comprised of commercial interests including forest owners, retailers, and consultants.

Professor Cashore notes that as a result of this competition, and as FSC and SFI fine-tune their standards in the U.S. market, the certification groups are currently adopting some of each other’s rules and procedures in hopes of being viewed as the main authority of governance. “You’re seeing a bit of convergence,” he says.

In the midst of this significant competition over the right to create these rules, Professor Cashore said the outcome could be quite substantial for forest management practices in the U.S. and



Benjamin Cashore, assistant professor of sustainable forest policy

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Yale's Global Institute of Sustainable Forestry

Major Initiative Strengthens Forestry Program

The Yale School of Forestry & Environmental Studies has launched a major initiative to expand and strengthen the school's forestry program by creating Yale's Global Institute for Sustainable Forestry.

The Global Institute for Sustainable Forestry combines a range of programmatic areas, including the Yale Forest Forum, the Forests Dialogue Secretariat, Program on Landscape Management, the School Forest System, Program on Forest Biotechnology, Program on Forest Certification, and the Program on Private Forests.

"For a hundred years, this school has been a leader in forest research and training, and, with forests at home and abroad greatly threatened, this is the time for innovation and new initiatives. We are integrating, strengthening and redirecting our forestry research, teaching and outreach activities to pursue this goal," Dean James Gustave Speth said.

Drawing on a faculty report, "Redefining Forestry at Yale," and on the outcomes of the Seventh American Forest Congress, the Global Institute of Sustainable Forestry will focus its forestry activities on maintaining and enhancing the health, biological diversity and quality of forests nationally and globally. Chad Oliver, M.F.S. '70, Ph.D. '75, who joined the faculty in January as the Pinchot Professor of Forestry & Environmental Studies, has been named the Global Institute's director, and he is assisted by Gary Dunning, executive director and formerly staff director of the Yale Forest Forum.

"The school is committed to providing the knowledge base and people needed for the implementation of sustainable forest management and the further development of the principles and practice of ecosystem

management, conservation biology and ecological restoration," Dean Speth said.

The Global Institute will focus on the integrated study of all forest values, including carbon sequestration, biological diversity, timber, fuel wood and renewable energy, watershed protection, recreation, wilderness, ecosystem services, and the huge array of other tangible and intangible forest products including the livelihoods of rural peoples.

"Yale's forestry program began with the conservation movement—what some would call an environmental movement—over 100 years ago," Professor Oliver said. "With Yale's leadership we made great progress in changing from 'cut-and-run' timber practices to sustainable management. In the process, we helped avoid an impending timber shortage and actually helped change many timber companies from non-sustainable logging operations to those most concerned about sustaining forests. This effort was successful because Yale provided the leaders in science, management, and policy in all areas concerned with forestry. Yale was a leader because its graduates had a common understanding, mutual respect, and excellent education in a tradition of leadership, science, accomplishment, importance, and maintaining a high moral focus."

In the 1970s the school's focus expanded because many of the world's environmental issues could not be resolved by concentrating on forests alone. In the past 30 years a global consensus has emerged for the need to protect the environment. "A lot of progress was made with air and water pollution and other issues that could be solved by relatively few, centralized actions," Professor Oliver said. "The role of



Gary Dunning, left, and Chad Oliver

“The role of forestry in an environmentally sensitive world has remained a sticky issue.”

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forestry in an environmentally sensitive world has remained a sticky issue. With people concentrated in cities, forests are sometimes viewed as irrelevant and best managed by being shut down. This perspective is becoming pervasive enough that many forestry schools and funding sources in the United States are shifting away from forestry research and education to other aspects of the environment.”

He said such actions would be extremely deleterious to those who live in cities and rural areas. “Managed properly in a variety of ways—from judicious reserves to proactive management—forests sustain a multitude of species, provide timber that substitutes for more polluting materials, protect watersheds, sequester carbon, and provide livelihoods, income, and recreation—all of which lead to a more diverse quality of life.”

Professor Oliver said the first challenge of the Global Institute is to ensure that forestry remains a significant issue in the environmental debate—to ensure that the 25 percent to 40 percent of the world’s land area in forests plays a positive role in people’s futures. “The challenge lies both within the School of Forestry & Environmental Studies and beyond. We have the advantage of the school housing other aspects of the environment under the same roof with forestry. In this way, we can readily engage them in broader issues, with forestry as an important component of the world’s ecosystem. Global Institute can also address the challenges beyond the school, armed with its experience in working with other aspects of the environment within the school.”

Yale traditionally has had a complementary relationship with other forestry programs in the United States. Professor Oliver said Yale relies on other forestry schools to send students to the F&ES master’s program to mix with students from other institutions from around the world, as well as students from non-forestry backgrounds.

“Since our students learn a lot from each other, it is important that we maintain a strong, diverse core of students with forestry backgrounds. Through contacts with other students, visiting lecturers and faculty, Yale’s graduates become well educated and well connected. Not being tied to a state or other government institution, Yale has the latitude to address issues beyond and overlapping government borders—something the students benefit from. On the other hand, Yale has a relatively small forestry doctoral program; therefore, we can offer a diversity of students to doctoral programs at other forestry schools. For the sake of our students—and for forestry as a whole, Yale really wants to see the forestry programs strong at many institutions.”

The second challenge, according to Professor Oliver, is to decide what the issues are and then how to address them? During the past decade, an international consensus emerged for sustainable forests; that is, each forest type—or ecosystem—should provide its “fair share” of values. The “fair share” means both fair to other forests of the world and fair to the present and future generations. A list of what values need to be “fairly” provided include: biodiversity, commodities, forest “health,” soil and water conservation, carbon sequestration, socioeconomic viability of people, and an infrastructure of laws, research, incentives, etc. to enable the first six to occur.

“The challenge is to provide these values within an efficient socioeconomic system. To reach a common goal—sustainable forestry—many individual actions will need to be taken by many people at many levels in many places in the world, from local community leaders to private and public forest managers to policy makers, NGO administrators, financial managers, scientists, and others. The emerging result of these many efforts will lead to the goal.”

According to Professor Oliver, neither Yale nor anyone else can dictate the changes that need to occur. However, he said the Global Institute can lead by providing the expertise, science, technology, and leadership that enables people to determine their own destiny. “Yale already has a lead because of its large number and broad geographic distribution of graduate students and alumni. Global Institute is adding to this strength by leading the school in acquiring and using computer technologies that local communities—and our graduates—can learn. We are also adding video conferencing at different levels

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(personal computer and higher levels) that allow us to provide interaction, outreach, and assistance of high scientific quality throughout the world.”

He said the third challenge is to maintain the breadth and quality of the F&ES forestry program. Forestry opportunities and issues can range from the level of individual animals and plants (genetic engineering) through the stand, landscape, regional, national, and international levels. And, the opportunities and issues can be based on biological sciences, social sciences (including economics and policy), or the different values forests can provide—or a combination of these.

He said Global Institute is maintaining its breadth and quality by focusing on key programs, initiatives, and forums at a range of these levels. “We will not become involved in all issues, but we will take the lead on some issues, be an active participant in others, and constantly ask the question: ‘What issues need to be addressed that are currently ignored?’ In this way, Global Institute will maintain its breadth and will help the greater forestry and environmental community—as well as the School of Forestry & Environmental Studies—engage in and resolve key issues in scientifically rigorous ways.”

Other issues the Global Institute is addressing are the policy relationships between cities and rural peoples, and comparisons of forest development processes between temperate and tropical forests.

“Yale’s Global Institute will rely on the School of Forestry & Environmental Studies’ traditional strengths—faculty, alumni, students, tradition, and a sense of the importance of Yale to forestry in the United States and the world. We are also enhancing these strengths with cutting edge sciences and technologies that allow us to maintain our leadership. Adopting these sciences and technologies are also a strong part of the Yale’s forestry tradition for over 100 years: We learn from and respect the past, but live in the present and live for the future.”

You can visit the web site of Yale’s Global Institute of Sustainable Forestry at: www.yale.edu/gisf.

Global Institute *at a glance*

Yale’s Global Institute for Sustainable Forestry

Chad Oliver • Director

Gary Dunning • Executive Director

Mission: To better understand and support the sustainable management of forests worldwide. To create and test new tools and methods. To foster leadership through innovative programs and activities in research, education and outreach.

Program on Private Forests

Chad Oliver • Director

Mary Tyrrell • Program Director

Mission: To better understand and support the stewardship and long-term sustainability of private forestlands through research, education and improved communications.

Program on Forest Certification

Ben Cashore • Chair

Michael Washburn • Director

Mission: To document, research, teach, and foster innovations in sustainable forest management and the methods and tools by which we measure it.

School Forest System

Mark Ashton • Director

Alex Finkral • Manager

Mission: To provide educational, research and professional opportunities in the context of a working forest for faculty and students.

The Forests Dialogue Secretariat

Tim Gregoire • Faculty Director

Gary Dunning • Secretariat Director

Mission: To promote and support the work of The Forests Dialogue.

Landscape Management Program

Chad Oliver • Director

Mission: To study the spatial and temporal interactions of groups of forest stands, and to develop methods and tools for their effective management.

Yale Forest Forum

Gary Dunning • Director

Mission: To facilitate open dialogue and the education of the Yale community and the public on issues related to sustainable forestry and to act as the convening body for the GISF.

Program on Forest Physiology and Biotechnology

Graeme Berlyn • Director

Mission: To study the interrelationships between physiology, morphology, and genetics of forest plants in relation to biotechnology, silviculture, management and policy.”

Taking the Pulse of the Forest

“I love teaching.
That’s why I came
back here.”
Ann Camp M.F.S. ’90

By Frank Szivos

Consider Ann Camp M.F.S. ’90, lecturer and research scientist at the Yale School of Forestry & Environmental Studies, the physician of the forest. Through her research, she has monitored the health of many forests in the inland Northwest, concentrating on late-successional and old growth forests on the east side of the Cascade Mountains in Washington.

Old growth and late-successional forests are important because many kinds of wildlife depend on them. However, a century of fire exclusion has made many of them vulnerable to insects, pathogens, and especially catastrophic fires, Camp explained. “Many of our western forests historically burned on a regular basis and rarely developed late-successional structures and compositions,” she said. “Frequent, low-severity fires kept these forests open and park-like. Suppressing fires allowed once open forests to develop dense understories. Eventually these forests accumulate so much fuel in the form of dead trees and logs that a fire, once ignited, cannot easily be suppressed and the entire forest is consumed.”

Camp has done extensive research on the amount and patterns of fire refugia—places on the landscape that historically burned less frequently than the surrounding forest. In fire-regulated landscapes, such as those in eastern Washington, fire refugia were places that served as reservoirs of plant and animal species associated with late-successional forests. Their current importance is, as Camp explains, “locations where late-successional forest habitat can be sustained on landscapes that are prone to burning.” Her research study resulted in insightful prescriptions for creating fire-resistant landscapes and healthier forests and helped land managers create more sustainable habitats for spotted owls.

Besides fire, Camp is interested in the effects of insects and diseases on forest ecosystems. “I’ve always been interested in the processes that create forest structures and how sometimes these same processes seem to run amok,” Camp said. “Insects and pathogens can be important regulators of ecosystem function, and they contribute substantially to creating wildlife habitat, but sometimes—especially with exotic insects and diseases—insects and pathogens can have pretty severe impacts on our forests.”

After more than a decade as a Research Forester with the U.S. Forest Service in Washington, Camp changed gears, returning to Yale as a member of the School of Forestry & Environmental Studies faculty. Last fall, she taught “Forest Stand Dynamics” and will teach two courses this spring: “Forest Health” (entomology, pathology, invasive species, and other stresses on the forest ecosystems) and “Fire, Ecosystems, and People: A Global Perspective.” She finds teaching an exciting challenge and has integrated an earlier career in distance learning and computer-aided curriculum design by developing courses that address students’ different learning styles. As she becomes more familiar with the southern Connecticut forests, she also hopes to incorporate more fieldtrips and field-based activities in her courses.

Camp is excited about the courses she is teaching this spring and plans to get students in her fire course to assist with a prescribed fire. She is working with doctoral student David Ellum who has written a prescribed burning plan for restoring a meadow and maintaining an oak savannah on the Yale-Myers forest in Union, Conn. “In New England, fires historically were important in developing and maintaining open forests dominated by oak. Unburned, many of these stands will



Ann Camp, lecturer in stand dynamics and forest health

Taking the Pulse of the Forest

develop a dense understory,” Camp said. “We also see this prescribed fire as a tool for meadow restoration, improving wildlife habitat and reducing the threat of invasive, non-native plants.”

Although initially focusing on teaching, Camp looks for research opportunities, especially research that is multidisciplinary and collaborative. She co-authored a Congressionally-mandated research plan for evaluating the economic and ecosystem effects of silviculturally treating forest stands to reduce risk of fire and insect outbreaks and provide a sustainable flow of small-diameter timber to resource-dependent communities in northeastern Washington. Making sure research results reach the intended audience is another priority. “We’re convening a symposium this spring to share the preliminary results of this study with landowners and forest managers in the inland West,” Camp said. “This will also be an excellent opportunity for several of my students who are interested in these issues.”

Camp and some of her students are also assisting the Forest Service’s Rocky Mountain Research Station on a project to assess stand development processes and small-scale disturbances, including root-rots and other pathogens and their combined effects on fuel buildup and potential fire behavior.

The mother of a 15-year-old, Camp is temporarily a single parent since her husband, a retired Naval officer, was called back to active duty after the attacks on the World Trade Center and the Pentagon. He is serving in Bahrain. She also misses looking out her window and seeing snowcapped peaks and the Wild and Scenic River. But, she said, “Southern New England is beautiful too, with interesting hikes nearby and of course the Sound, with its many opportunities for kayaking.”

Camp, who holds a Ph.D. from the University of Washington, keeps her finger on the pulse of complex forest ecosystems through her teaching and research. She’s one who certainly sees the forest for the trees and can teach others how best to sustain healthy ecosystems that provide an array of benefits for people and wildlife.

“I love teaching. That’s why I came back here,” Camp said. “I hope I can help students think about how forests develop and to use that knowledge to better integrate sustainable forestry and sustainable communities. We need to better predict where problems can arise and determine ways to reduce threats to forests—in New England, the West, and globally. It’s a big job, but it’s an exciting one.”

F&ES Considering Establishing *Forest Endowment*

The School of Forestry & Environmental Studies is considering establishing a *Forest Endowment*, which would provide alumni/ae and others the opportunity to make gifts of working forestland to Yale. This *Forest Endowment* would be managed to maintain the value of the underlying forestland assets while generating cash flows from the sale of certified timber to the school’s operating budget.

The *Forest Endowment* would offer many benefits and opportunities, including:

Encouraging additional giving to F&ES in the form of forestland;

Promoting the conservation of forested areas in the U.S. and abroad;

Developing a leading working laboratory of certified forest management; and

Encouraging student, faculty, and alumni/ae learning through involvement in managing the *Forest Endowment*.

The most direct benefit of the *Forest Endowment* would be the additional source of revenue for the school.

We Need Your Advice

F&ES would like to draw on the wealth of experience of its alumni/ae and friends to guide the development of the *Forest Endowment*. Since the *Forest Endowment* is in the formative stage, we would like to hear your comments and ideas.

If you would like to be kept informed as we develop the concept, contact Dean James Gustave Speth at the Yale School of Forestry & Environmental Studies, 205 Prospect Street, New Haven, CT 06511.

URI's Open Spaces as Learning Places Program

Introducing Students to a New World in Their Own Backyard

By David DeFusco, EDITOR

On a mild, sunny weekday morning last September, the joyful chatter of 30 children ambling single file down Nash Street in New Haven could be heard from a distance. Led by a tall, sandy-haired woman, they stopped periodically to gaze at the trees and other greenery that sprout from the pock-marked concrete sidewalk and surrounding front lawns, absorbing their leader's insights and cheerfully volunteering their own observations.

The children are third-graders from Worthington Hooker elementary school and their leader is Susan Swensen, an alumna of the School of Forestry & Environmental Studies. They were on their way to a formerly abandoned lot wedged between two-family homes in this solid, working-class neighborhood for a lesson in science.

The lot is 50-feet wide and 120-feet deep and for 30 years an eyesore, the repository for trash and the remains of a home that had burned to the ground. But, recently, with a grant from the Community Foundation for Greater New Haven Foundation and the Livable City Initiative, the Nash Street neighbors and URI's Greenspace Program have converted the barren lot into a community greenspace.

Now, where there was a foundation's rubble is a bench formed by its blocks. The remnants of a chimney now complete a pretty walkway and a barbecue pit. Scattered throughout the lot are



Susan Swensen, coordinator of the Open Spaces as Learning Places program, helps a Worthington Hooker fifth-grader identify a plant during a scavenger hunt on Nash Street.

“Students were thrilled to spot wildlife that they had never seen before.”

new plantings—Magnolia and Beech trees, Hydrangea, Cottoneaster, Holly, and Russian sage—that surround a man-made pond inhabited by frogs and salamanders. A gazebo, built by the neighbors, is now used by them for parties or respite.

“People move here because of the greenspace,” Colleen Murphy-Dunning, director of the URI. “The neighbors restored the derelict lot and now are the stewards of this open space.”

The greenspace also is an educational resource. Last spring, the URI launched a new environmental education program, called Open Spaces as Learning Places, that teaches science to elementary school students and their teachers through the exploration of local open spaces.

The program teaches 100 third- and fifth-graders in Worthington Hooker and East Rock elementary schools about six types of open spaces in the city: school grounds, reclaimed abandoned lots, city parks, rivers or watersheds, golf courses and cemeteries.

At the Nash Street greenspace, students explored the history of the site, searching for clues to the past as they examined plant and animal adaptations to the newly created habitat. In the middle of it all, guiding the students in their discoveries, was Ms. Swensen, coordinator of the Open Spaces as Learning Places program. She teaches and implements the program in the classroom, and supervises F&ES graduate student interns who assist in teaching the program and provide technical assistance to teachers.

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“We’re introducing teachers and public school students to natural resources in their neighborhood that they didn’t know existed,” said Ms. Swensen, who earned a master’s degree in forest science in 1983 and is a lifetime member of the city’s Park Commission.

“The program raises ecological awareness and appreciation of the urban environment. So often nature is presented negatively with an emphasis on global environmental problems, but this program focuses on the positives. Students are encouraged to understand and care about the environment through exploration and discovery of local natural resources before learning about broader environmental threats. We’re introducing young people to a new world that has always been there. We show them that there is so much to see, if they just stop and use all of their senses. We want them to care enough about these places and share their concern for the local environment with their families so they all become stewards.”

Assisting her are William Finnegan ’03, Alexandra Dimizas ’03 and Shalini Gupta ’02, who are all studying for master’s degrees in environmental management. Lianne Fisman ’01 interned last spring and is now pursuing a doctoral degree at MIT.

“The first thing the children would ask when we arrived is if we would be going outside that day,” Mr. Finnegan said. “I definitely sensed a growing appreciation on their part for parks and open spaces.”

The program is taught over 12 weeks. Each week begins with an indoor, hands-on lesson that introduces the ecological topics for an open space excursion. Then the following week, teachers lead a follow-up classroom activity, called an extension, designed to deepen their understanding of the concepts related to the open space and assess student learning. “The purpose of extensions is to create continuity of the program when URI is not there, and give teachers the training and confidence to conduct the curriculum on their own,” said Ms. Gupta.

Topics include the changing landscape, forest structure and dynamics, natural cycles, adaptations, biodiversity, the connections between species and habitat diversity, and the impact of the urban environment (e.g., sprawl and pollution) on its natural counterpart.

For example, Ms. Swensen had her students make a watershed model out of diatomaceous earth which they developed by adding Monopoly houses to learn about erosion and the effects of pollution. “In their model rivers, they saw erosion, which occurs over thousands of years, take place in minutes,” she said. “They took ownership of their watersheds and were troubled as pollutants seeped through the model, passed their homes and flowed down their river into Long Island Sound.”

Then the students took a canoe trip on the Mill River in East Rock Park with the help of the Park Department’s riverkeeper, Peter Davis. “That was a highlight of the school year for the classes,” said Pamela Nuzzo, a Worthington Hooker teacher. “Students experienced, first-hand, the river features they had observed in their classroom models, and they were thrilled to spot wildlife that they had never seen before: muskrat, turtle, heron, egret, kingfisher and osprey.”

The students also visited Grove Street Cemetery where they spied names on the weathered tombstones, which served as an interdisciplinary lesson in social history and geology while reinforcing a theme throughout the program that things change over time. “The final field trip brought students full circle, back to the first lesson in which they mapped New Haven’s landscape from pre-settlement times to the present,” Ms. Swensen said. “Students recognized names of community leaders and understood how they too could shape the future of New Haven.”

Ms. Murphy-Dunning, who oversees the program with Ms. Swensen, said ecosystem concepts are taught traditionally through indoor exercises on ecosystems far from the students’ homes. “Our



Swensen provides opportunities for direct experience with nature in class by bringing in animals and setting up tanks for long-term observation.

URI's Open Spaces as Learning Places Program

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“I have never felt more connected to the URI mission. It is so rewarding to hear students say that they never enjoyed school so much and never knew science could be so much fun,” said Susan Swensen M.F.S. '83.

curriculum utilizes the urban environment, a typically ignored or misunderstood ecosystem, as a relevant place for the children to understand science and equips teachers to integrate environmental education into the year-round curriculum,” she said .

Ms. Swensen said she took the students to Nash Street because it is a wonderful example of neighborhood residents having a positive impact on the local environment. The greenspace offers a safe, confined area for students to wander and explore freely. “They feel comfortable and that is important in developing the confidence to go outdoors,” she said. “They learn to appreciate the outdoors and their community.”

The Hooker students also benefited from Ms. Swensen’s passion for wildlife. She is licensed by the State to care for injured and orphaned wildlife at her home in the Westville section of New Haven where she has lived for the past 16 years with her husband David, Yale’s chief investment officer, and their children Tory, 16, Alex, 13, and Tim, 7.

Ms. Swensen shares her rehabilitation experiences with students in an urban wildlife slide show that she created to teach students about the wide variety of wildlife in New Haven. She provides opportunities for direct experience with nature in class and outdoors by bringing in animals and setting up tanks for long-term observation. To encourage writing and nature exploration at home and school, students keep a journal throughout the program.

This spring, the program will train eight New Haven public school teachers in strategies for using open spaces as learning places, through direct participation in co-teaching the program, training workshops and ongoing technical assistance. Training focuses specifically on an Open Spaces as Learning Places curriculum and, more generally, on the learning opportunities inherent in the local environment across a range of classroom subjects, including geography, social studies, math and literature.

The goal is to have teachers continue the program on their own. Ms. Gupta, who hopes to become an urban planner when she graduates, is developing extensions to the curriculum that can be used by teachers without the assistance of Ms. Swensen or graduate school interns. “Teachers are integral to the sustainability of the program,” Ms. Swensen said.

The URI is working with the New Haven Public School’s Science Supervisor, Dr. Marc Blossveren, to ensure that the curriculum helps students achieve the district’s environmental academic standards. Since 1991, the URI and F&ES have worked with more than 2,500 K-12 students from 20 local schools to study wildlife and ecosystems, create nature trails, and restore their school grounds and neighborhoods.

“These students are old enough to understand and appreciate the complex nature of local ecological systems and young enough to retain their sense of wonder that comes from investigating the world around them,” Ms. Swensen said.

Ms. Nuzzo and other Worthington Hooker third-grade teachers, Kelley Auringer, Lan Linn and Nichola Bankuty, praised Swensen for her creativity, well-planned lessons and teamwork. “With Susan’s enthusiasm, dedication and hard work, this program brought environmental education to life for the students and teachers,” Ms. Auringer said. “It was a pleasure and honor to work with her on this excellent program.”

Ms. Swensen said the program is the culmination of efforts on the part of many people, including Anne Harper '91 who introduced the concept at Edgewood public school a decade ago. “I have never felt more connected to the URI mission,” said Ms. Swensen, a member of its board since 1991, “and it is so rewarding to hear students say that they never enjoyed school so much and never knew science could be so much fun.”

Greenspace Program URI Receives Howland Award



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Colleen Murphy-Dunning



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Chris Ozyck

The Urban Resources Initiative's Community Greenspace Program has won the Howland Award for Urban Environment. The award was presented by the National League of Cities in Atlanta last December to Greenspace Manager Chris Ozyck, right, who is pictured with Colleen Murphy-Dunning, director of URI. The award is given to programs that demonstrate and encourage the "preservation and/or enrichment of a high environmental quality of life." The Community Greenspace program combines urban restoration and community organizing in inner-city neighborhoods. In partnership with the Community Foundation for Greater New Haven and the City of New Haven, the URI works with New Haven residents from gardening groups, block watches, churches, and other community-based organizations that take part in projects to reclaim abandoned lots and restore green spaces. The URI was founded in 1988 by Professor William Burch, the Frederick C. Hixon Professor of Natural Resource Management, as a clinical teaching program for urban social forestry.

Professor Graedel

Up to the Grand Challenges

“The nice thing about this is it was received with enthusiasm and is playing a major role in guiding the thinking of experts and decision-makers,” Professor Graedel.

By John Courtmanche

When the National Science Foundation (NSF) announced last fall that it would begin funding university-level research in materials use—understanding the supply, use, and reuse of the materials contained in today’s massive variety of manufactured goods—Yale’s Thomas Graedel was particularly pleased. For this new initiative was motivated by a report called Grand Challenges in Environmental Sciences, produced by a National Research Council committee chaired by Professor Graedel, which identified eight environmental challenges most worthy of attention by NSF in particular and the Western scientific community in general.

“Many well-written reports that come out of the National Research Council are put on the shelf and don’t really stimulate any useful action,” said Graedel, the Clifton R. Musser Professor of Industrial Ecology. “The nice thing about this is it was received with enthusiasm and is playing a major role in guiding the thinking of experts and decision-makers.”

The council’s committee on the Grand Challenges in Environmental Sciences convened in 1999, soliciting ideas from U.S. scientists (and a few foreign contributors) about which challenges deserve utmost attention, reviewing the more than 200 submissions, and debating them against a set of criteria. The committee’s criteria for choosing a Grand Challenge included its promise of high scientific and practical payoff, large scope, relevance to important environment issues, and feasibility. “It can’t be grand if you can solve it tomorrow, but not useful if we don’t know how to start,” Professor Graedel said. “We focused on those challenges where we knew how to begin, and which would take 10 or 20 years to resolve.”

As chair of the committee, Professor Graedel’s responsibility was “to make sure we didn’t come up with 1,000 challenges or no challenges,” he said. “We had to get a committee of 17 people from a range of backgrounds to come to a consensus on a small number of topics to guide NSF.”

He said the process was difficult because the committee members had their own biases related to their respective professional work and areas of expertise. The committee gradually “merged, altered and substituted” ideas and zeroed in on a small number of broad, interdisciplinary challenges. Identifying the top eight ultimately required a vote of the committee members, who identified the following Grand Challenges:

BIOGEOCHEMICAL CYCLES—to further the understanding of the Earth’s major biogeochemical cycles, evaluate how they are being perturbed by human activities, and determine how they might better be stabilized;

BIOLOGICAL DIVERSITY AND ECOSYSTEM FUNCTIONING—to improve understanding of the factors affecting biological diversity and ecosystem functioning, including human activity;

CLIMATE VARIABILITY—to increase our ability to predict climate variations, to understand how this variability may change in the future, and to assess the resulting impacts;

HYDROLOGIC FORECASTING—to develop an improved understanding of and ability to predict changes in freshwater resources and the environment caused by floods, droughts, sedimentation and contamination;

INFECTIOUS DISEASE AND THE ENVIRONMENT—to understand ecological and evolutionary aspects of infectious diseases, as well as the interactions among pathogens, hosts/receptors and the environment, and thus make it possible to prevent changes in the virulence of organisms that threaten plant, animal and human health;

CONTINUED on Next Page

INSTITUTIONS AND RESOURCE USE—to understand how human use of natural resources is shaped by institutions such as markets, governments, and international treaties which create rules to govern resource extraction, waste disposal and other environmentally important activities;

LAND-USE DYNAMICS—to develop a systematic understanding of changes in land uses and land covers that are critical to ecosystems and human welfare;

REINVENTING THE USE OF MATERIALS—to develop a quantitative understanding of the global budgets and cycles of those materials widely used by humanity, and of how the life cycles of these materials may be modified.



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Thomas Graedel, Clifton R. Musser Professor of Industrial Ecology

The report was published in the summer of 2000 and has been informing NSF in creating its priorities, beginning with the aforementioned announcement of funding for materials use research. Dr. Graedel is excited by this new funding not only because it was built on the work of his committee, but also for more personal reasons: it relates to his own research on the cycles of industrial materials as professor of industrial ecology at the Yale School of Forestry & Environmental Studies. Professor Graedel stressed though that he was not the one to suggest materials use as a grand environmental challenge; his main objective as chairman was to get consensus among the committee members and produce a report.

Professor Graedel's research at F&ES focuses on the relationship between modern technological society and the environment. He has been a pioneer in developing approaches and practical techniques to enable manufacturing companies to interact optimally with the environment. He is also an authority on materials corrosion and material reservoirs; in addition to his post at F&ES, he is a professor in the Yale

departments of chemical engineering and geology and geophysics. His textbook *Industrial Ecology*, co-written with B. R. Allenby of AT&T, was the first book in the field, and he has followed it with three others: *Design for the Environment*, *Industrial Ecology and the Automobile*, and *Streamlined Life-Cycle Assessment*. For his work, Yale honored him last fall with an appointment as the Clifton R. Musser Professor of Industrial Ecology, an endowed chair.

The Yale administration has also asked Professor Graedel to chair the university's new Advisory Committee on Environmental Management, essentially a first step toward "greening" Yale. Its a university-wide committee comprised of faculty, administrators, staff and students, whose charge is to recommend to Provost Alison Richard a program of responsible environmental management for the university. In particular, the committee is looking at five areas: purchasing; land use; energy and water use; design, construction and renovations of buildings; and reuse, recycling and disposal, with the intention of making recommendations in those areas. He believes by forming this committee, the university is sending an important signal on its responsibility for stewardship related to its facilities and operations.

At the same time, Professor Graedel's work for the National Science Foundation is not over. He continues to serve the federal agency as a member of its Advisory Committee on Environmental Research and Education. The committee is advising the NSF in part on its annual investment of roughly half a billion dollars in environmental research, he explained, and is charged with writing an advisory document. "The hope of the committee and NSF is that this leads to increased funding for high-quality environmental science," he said, "And enables decisions related to the environment to be made from a knowledgeable base."

The "Grand Challenges in Environmental Sciences" is available for download at www.nap.edu

Tributes

WILLIAM SMITH: Deftly handled many roles during 35-year career.

When it came to attracting big federal dollars for support, William Smith's early research on tree root systems didn't have the allure of his other research on air pollution and energy. Maybe it was because most of the work took place underground. Maybe because tree root systems aren't sexy enough to capture the public's imagination. In any case, by his own estimation, it was his most important research during a productive career that spanned 35 years.

Carried out mostly at the Hubbard Brook Experimental Forest, Professor Smith's research supported the notion that there is a two-way transfer of materials that is important in plant health, and it helped increase understanding of the complexity of underground ecosystems. He also discovered that roots leak materials into the soil, which explained why microorganisms live around tree roots. Until then, very few efforts were made to quantify that material and the influences on that loss.

"Working below ground is difficult, which is why there wasn't a lot of work in this area, whereas there is a lot of federal support for research on air pollution and energy," Smith said recently from his home in Moultonborough in central New Hampshire.

His research did attract support from the National Science Foundation, the U.S. Department of Agriculture, the Connecticut Research Commission and others, and resulted in the publication of several journal articles and a 309-page book, *Tree Pathology: A Short Introduction* (1970).

In addition to his research on tree root systems, he did a significant amount of work on air pollution. He published the book: *Air Pollution and Forests: Interactions between Contaminants and Forest Ecosystems* (1981; second edition, 1990), and wrote several book chapters on the effects of air pollution, acid rain and ozone on forest ecosystems.

Raised in Trenton, N.J., William Hulse Smith, the Clifton R. Musser Professor Emeritus of Forest Biology, took an early liking to trees and forests from his exposure to the outdoors on fishing trips with his father. "Forests were pleasant, and I was always excited to be in them. I was interested in knowing why trees are able to grow in miserable conditions and why there were so many."

After graduating from Ewing High School in 1957, he attended Rutgers University. He majored in biology, taking some forestry courses, and was recommended to the School of Forestry, as it was then called, by Richard West '42. While a master's candidate, Ellis Cowling, a member of the faculty, inspired Professor Smith with an interest in tree health issues.

He returned to Rutgers after getting a degree in forest biology from F&ES and obtained a Ph.D. in plant pathology and soil microbiology. In 1966 he joined the F&ES faculty, beginning as an assistant professor of forest pathology and rising through the ranks until his appointment as the Clifton R. Musser Professor of Forest Biology. In addition to teaching, he served in ably several administrative positions, including Acting Dean (1981-83 and 1998-99), Associate Dean (1978-79 and 1992-98), and Assistant Dean (1971-78). In fact, his reputation for deftly managing various temperaments and bureaucracy resulted in offers of deanships at Duke and Texas A&M, which he turned down. From 1985 to 1992, he was chairman of the undergraduate second major, Studies in the Environment,

which recently was discontinued to make way for the establishment of a primary major in Environmental Studies.

He was less enamored of administrative responsibilities, which included budgeting, personnel issues and strategic planning, but accepted them cheerfully and carried them out diplomatically. "The experiences gave me a tremendous perspective."

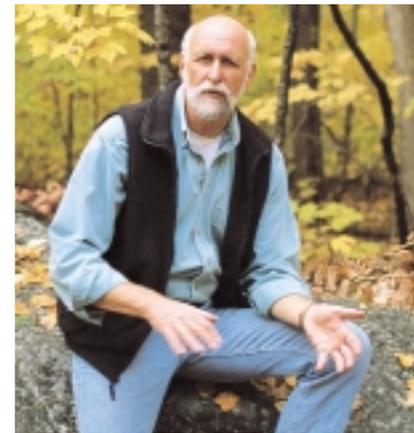
He also served on numerous doctoral committees, supervised several dissertations, and holds a distinguished record of professional and public service, serving on boards or as a member of the National Academy of Sciences, USDA Forest Service, U.S. Environmental Protection Agency and, since 1985, the State of Connecticut Siting Council, which regulates the design and site selection for electric generating and electric and gas transmission facilities, utility and state-owned telecommunications towers, and hazardous waste and low-level nuclear waste disposal facilities.

He said teaching—in his words, contributing to the understanding of how the world works—was the most satisfying aspect of his career. "Teaching is immediate, intimate. Then they (students) go out and do great things."

He taught graduate courses in "Forest Ecosystem Health: Science and Management", "Ecotoxicology: Air Pollution and Forest Ecosystem Health Stress", "Waste and Materials Management", and "Ecological Resource Risk Assessment and Monitoring", as well as on the undergraduate level, "Ecology in Ecosystem Conservation and Management." "He was a key educator, a wonderful teacher," said Marian Chertow, who directs the Industrial Environmental Management Program and co-taught with him the course on Waste and Materials Management. "He explained complex subjects simply."

In retirement he is a consultant for companies doing siting work, does pro bono work for a variety of organizations including the Lakes Region Conservation Trust, which is acquiring 10,000 acres of land for preservation, and travels once a month to Washington, D.C. as a member of the EPA's Science Advisory Board, deliberating on cancer guidelines, dioxin and standards for arsenic in drinking water, among others.

When he's not traveling, he enjoys the company of his wife, Deborah, a middle school science teacher, watches his son Tyler, a high school junior, play soccer and basketball, and visits with his two other sons, Philip, who lives a mile away, and Scott, who lives in Chester, Conn. "I was blessed to have had such a rewarding career at the School of Forestry & Environmental Studies, but 35 years in one place was enough," Professor Smith said. "I met and became friends with a lot of bright and committed people while I was there and I'll always carry with me their inspiration and ideals."



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JOHN GORDON: A forester who helped shape a modern environment school.

The Yale School of Forestry & Environmental Studies exists today in large measure because of the efforts of John Gordon, who served as dean from 1983 to 1992.

Ask him about his proudest accomplishment and he says without hesitation that it was making sure that the school, which was founded over 100 years ago, was not demoted to an arts and sciences department. “[Then University President] Bart Giamatti told me when I arrived that unless things changed, the doors would close,” said Professor Gordon who retired last June as Pinchot Professor Emeritus of Forestry and Environmental Studies. So Dean Gordon set about developing new programs—the Tropical Resources Institute, Urban Resources Initiative and Industrial Environmental Management program were created on his watch—promoting interdisciplinary efforts among disciplines within the school, and recruiting new faculty, including Mark Ashton, professor of silviculture and forest ecology, Oswald Schmitz, associate professor of population and community ecology, Gaboury Benoit, professor of environmental chemistry, and Kristina Vogt, the school’s first tenured woman professor.

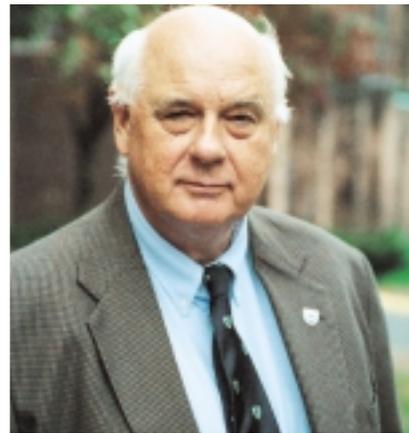
As a result of his efforts, applications and outside support increased and enrollment doubled to 200 students, leading to the formation of a modern environment school. “I’m most proud that the school is still here, flourishing and changing.”

Born in Napa, Idaho, outside of Boise, John Charles Gordon grew up planting trees. His parents owned a nursery and greenhouse business, and his father was an outdoorsman as well as a member of the horse cavalry. His mother wanted him to be an artist, but instead he went to Iowa State University to obtain a bachelor’s degree in forestry and doctoral degree in plant physiology.

“I like the way [trees] look, their infinite variety, the fact that you have these intricately organized living things that always change.”

Before coming to Yale as Dean, he was department head and the youngest professor of forest science at Oregon State University from 1977 to 1983, professor of forestry at Iowa State University from 1973 to 1977, and principal plant physiologist for the USDA Forest Service, North Central. Forest Experiment Station, from 1968 to 1970 where he conducted pioneering research on the physiology of wood formation. His research resulted in two important findings: he made the link between photosynthesis and respiration in leaves, and that a tree’s cambium (the outer layer between the bark and the wood) was able to divide new cells.

His research on the physical influences on how much wood and what kind is formed in trees is still, he acknowledges, a poorly understood process. “How food gets to the wood is a basic research question, but it determines how productive forests are in making wood and it has commercial consequences, as well as ecological and evolutionary significance. It’s a key to understanding forest ecology.” In addition, he has done research on biological productivity, continuing a career-long interest in biological carbon and nitrogen fixation, and worked with colleagues in the Pacific Northwest on adaptive management systems research. His research is documented in over 100 papers, chapters and books, and he taught courses and lectured in forest physiology, ecology and ecosystem management, forest policy, silviculture, agroforestry and leadership.



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“As a teacher, I learned more than any other way by contact with students. There is almost as much a variety of students as there are forests. I got much satisfaction from seeing doctoral students get focused and harness the tools to make intellectual advances—seeing the transition from knowing things to finding things out.”

Graeme Berlyn, professor of anatomy and physiology of trees, said that in addition to major contributions to forest science, management and education, he had an exceptional ability to inspire teamwork. Dean Gordon had formed the Program for Forest Microbiology and many faculty, Professor Berlyn recalled, had joined in the work, meeting every Friday for research seminars.

“This was part of John Gordon’s tenure that I enjoyed the most,” said Professor Berlyn. “His unique ability to conduct seminars and his extemporaneous wit communicated excitement that stimulated intellectual ferment. This translated to enthusiastic participation in the research effort. When John’s duties as Dean became too demanding and he could no longer lead the group none of us could replace his leadership. It was a supportive and inclusive leadership based on mutual respect and consideration that many aspire to, but few can achieve.”

According to Professor Berlyn, Dean Gordon’s leadership echoed his open-minded approach to science and is his biggest legacy. “John initiated the extension of our worldview to include urban ecosystems with the view that forests are not isolated ecosystems that are immune from industrial and agricultural activities,” he said. “As we have seen, forests are definitely impacted by external factors and increasingly so as human populations of the Earth increase. During John’s tenure, we began to legitimize our study of other ecosystems, including industrial ones, as part of developing an appreciation of the whole biosphere.”

Dean Gordon was a member of many boards and committees. In 1989 he chaired a commission that reviewed science and management in U.S. national parks, and in 1990 he chaired a National Research Council Committee on Forestry Research. In 1991 he was one of four members, popularly called the Gang of Four, of the Scientific Panel on Late-Successional Forest Ecosystems (The Gang of Four returned to campus last fall to commemorate the 10th anniversary of the panel’s findings). The following year he was named Conservationist of the Year for his work on the panel. In 1993, he chaired the Indian Forest Management Assessment Team, which completed a review and assessment of forests and forest management on all U.S. Indian Trust Lands, and chaired a team of scientists that prepared a management strategy for the Coquille Tribe. He also served as president of the International Union of Societies of Foresters, and co-chair of the board of directors of the Seventh American Forest Congress.

“As Dean, John had a rare trait in that he was always positive about any ideas or areas faculty or students might want to explore,” Professor Berlyn said. “Things might not happen as planned, but exploration of new vistas was never discouraged.”

Visiting Faculty Think—and Act—Globally

“Anyone can
plant a tree....
If you have muscle
and the will, you
can accomplish
a lot,” said Maathai.

By Allison Macalady

Three visiting experts in conservation—**Wangari Maathai**, the founder of Kenya’s leading grassroots conservation group, **Lu Zhi**, a conservation biologist renowned for her work on panda conservation in China, and **Xuemei Bai**, whose research focuses on land use in Asia’s rapidly growing cities—recently have joined the faculty and are bringing a global perspective to the school this year.

“These professors are just the start of a long line of visiting professors from around the world, whose broad range of professional experience will enrich our students and faculty,” Dean James Gustave Speth said.

Wangari Maathai, who joined the faculty in January as the McCluskey Visiting Fellow for Conservation, hopes to bring a new awareness of environmental issues in Africa to F&ES students and faculty. Maathai is teaching a course, “Environment and Livelihoods: Governance, Donors and Debt”, with two new F&ES faculty members, Kathleen McAfee, assistant professor of social ecology and community development, and Lisa Curran, associate professor of tropical ecology. The course focuses on Africa, but includes case studies and comparisons from Asia, Latin America and the Caribbean.

Maathai is a veterinary doctor and a professor by training (she is the first woman from East Africa to earn a doctoral degree, obtaining one in 1971 from the University of Nairobi). However, it was her involvement in Kenya’s National Council of Women that led to her work on conservation issues. While president of the council, she started a project to improve the livelihoods and nutrition of Kenyan women. As the connections between nutrition and soil fertility became clear, her focus shifted from food distribution to improving land use practices among Kenyan farmers.

In 1977, she founded the Green Belt Movement to help Kenyan citizens to improve their local environments. The movement started simply by mobilizing rural women and schoolchildren to plant trees in their communities. “Anyone can plant a tree,” Maathai said. “If you have muscle and the will, you can accomplish a lot.”

The tactic worked. So far, over 200 million trees have been planted and the Green Belt Movement has grown into East Africa’s biggest grassroots conservation group.

With the success of the Green Belt Movement, she has begun work on a wider array of topics, such as how genetically modified seeds may impact food security in Africa and how the World Bank could better influence sustainable development projects and debt relief in Kenya.

While at Yale, she wants to emphasize the growing importance of citizen’s groups in the developing world. “These social movements have blossomed in the last 20 years,” she said, “and they are now a very important force.”

Her efforts have brought her accolades from across the globe. She has been honored with many awards for environmental leadership, including the Right Livelihood Award (1984) and the U.N.’s Africa Prize for Leadership (1991).

In 1997, she ran unsuccessfully for president, representing the Liberal Party in Kenya against incumbent President Daniel Arap Moi who has been in power since 1978. She has long maintained that corruption in the Moi government has prevented environmental conservation in the country.

She petitioned the World Bank and International Monetary Fund to require commitments to conservation be part of the conditions for any loan extended to the Kenyan government. She said that Kenya is operating far below internationally accepted forest conservation standards, and that



Wangari Maathai, McCluskey Visiting Fellow for Conservation

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“If Yale is talking about a global school, then China can’t be missed,” said Lu.

additional destruction of forests would have far-reaching consequences for the country’s rainfall pattern.

She also has addressed the United Nations on several occasions, including speaking on behalf of women at a special session of the General Assembly in 1997 for the five-year review of the Rio Earth Summit. Yale’s Global Institute for Sustainable Forestry at F&ES is providing support for her while she is at Yale.

Like Wangari Maathai, Lu Zhi works on developing community-based approaches to conservation in her native China. But Lu also started her career focused on science. In the 1980s and early 1990s, her tenacious fieldwork led to groundbreaking discoveries on the habitat and behavior of one of her country’s most elusive and endangered species, the giant panda. With her mentor, Pan Wenshi, she disproved the notion that panda numbers are declining because they have trouble breeding. The panda’s problem, she said, is dwindling habitat.

Lu and Wenshi’s discoveries changed the direction of China’s official policy—that of capturing pandas and putting them in zoos. “We cleared a lot of the clouds around the claims that pandas are doomed in evolution,” she said.

Lu left fieldwork in 1995 to collaborate with the World Wildlife Fund for Nature. Her first project was to promote a conservation ethic among the rural farmers who share the panda’s habitat. More recently, she has worked with the World Wildlife Fund in Tibet, developing community conservation

efforts there almost entirely from scratch.

“Community-based conservation is new in China,” she said, “and the concept of bottom-up is somewhat contradictory to the government system. We need to be clear and encourage participation at the level that the current system will allow. That requires a lot of training because people aren’t used to speaking up.”

Building capacity for local and regional conservation in China, and the developing world in general, is one reason she decided to join the F&ES faculty as an associate research scientist for the entire academic year.

“If Yale is talking about a global school, then China can’t be missed,” she said. “China is investing a lot of money in building new environmental programs, and that means there’s even more urgency to build capacity. There are lots of gaps there.”

She has received numerous awards for her work. The Chinese government named her one of China’s “Top 10 Young Intellectuals” in 1998, and in 1999, at the age of 34, she was named by the *New York Times* as one of China’s rising young stars. She also holds the position of associate professor of biology at Beijing University. Her observations about China’s conservation programs to protect the giant panda, the world’s most widely recognized conservation icon, and that country’s economic programs that ironically threaten the animal’s future were published last November in *Science* magazine (“Giant Pandas in a Changing Landscape,” Nov. 16).

Another native of China, Xuemei Bai, joined the faculty as an associate professor in the practice of urban ecology. Unlike Lu Zhi, Bai’s focus is Asia’s rapidly growing urban areas.

She has conducted numerous projects on urban ecological restoration and field surveys on urban environmental issues in Asian cities. Working closely with local scientists and municipalities, she hopes her work will help Asian cities to incorporate environmentally sound development practices.

“One-half of the biggest cities in the world are in Asia, and many of them are still growing. Often these cities don’t have the capacity to deal with the environmental issues brought by the rapid growth,” she said. “If you don’t resolve these things at the local level, they will become global issues.”

On a personal level, she said the beauty of patterns on the Earth’s surface led to her career working on Asia’s environmental problems.

“My undergraduate education was in structural geology, and remote sensing was just emerging. I was quite attracted to this,” she said. “You have very beautiful images of the

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Lu Zhi, associate research scientist

Visiting Faculty Think—and Act—Globally

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Xuemei Bai, associate professor in the practice of urban ecology

Earth's surface, and through these pictures you can see that the world is not as big as you have imagined. You realize that it's a very fragile and small system."

She decided to pursue her graduate degree in the application of remote sensing and GIS technology to global environmental monitoring and modeling. After graduating from Peking University with the top academic record in her class, she went on to receive a Ph.D. from the University of Tokyo in 1993. She then joined the Japanese Center for International Studies in Ecology, a research institute founded by the International Ecological Society and Japan's Ministry of Education. After working there for four years in urban ecology, she joined the Institute for Global Environmental Strategies, where she presently is the leading scientist for a research project on urban environmental management in Asia.

She is committed to bringing a more global perspective with an urban focus to students at F&ES. "Urban environmental problems are the most visible and acute environmental issues in many developing countries. The majority of natural resources are consumed in cities, and more and more people becoming urban residents. Asia is at the center of this trend."

Forest Certification—Supplanting Government Jurisdiction

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worldwide, affecting how future problems are addressed. For instance, if NGOs get more out of private systems, they might put less pressure on governments. As he writes in his new paper, "If non-state market-driven governance structures emerge in forestry that alter existing power relationships among environmental, social, business, and traditional governmental interests, there may be profound effects on other policy arenas and traditional domestic and international public policy making processes." Professor Cashore already notes the emergence of market-driven governance structures in other industrial segments such as fisheries, coffee, food production and tourism.

For his research, Professor Cashore is working with collaborators at the University of British Columbia, the University of Toronto, Freiburg and Cologne Universities in Germany, and with students at Auburn University where he previously taught. His expertise in the field is built on such positions as legislation/policy advisor to the leader of the Canadian New Democratic Party (1990-93), Harvard University Fulbright Scholar (1996-97), and postdoctoral fellow in the Forest Economics and Policy Analysis Research Unit at the University of British Columbia (1997-98). He holds a B.A., and M.A. from Carleton University, and a Ph.D. from the University of Toronto.

Commenting on Professor Cashore's research, colleague Chad Oliver, Pinchot Professor of Forestry and Environmental Studies and director of Yale's Global Institute of Sustainable Forest, said, "Besides government regulations and incentives, there are non-governmental approaches such as certification and selling of 'carbon credits.' These approaches sound exciting, but whether they are successful or not depends on the details. Ben's expertise on forest policy and his creative and analytical abilities are being focused on certification, and its many ramifications. He is strengthening our understanding of how certification works, what its advantages and pitfalls may be, and what potential it has as a way of influencing forest management."

ClassNotes

1922

The new Forestry Education Center of the Fox State Research and Demonstration Forest at Hillsboro, N.H., has been named in honor of the late **Henry I. Baldwin** who established the forest and devoted his long scientific career to its work.

1929

Gregorio Zamuco, dean emeritus of the University of the Philippines at Los Baños College of Forestry and Natural Resources, was awarded a Special Century Award by the College's Alumni Association. The award was granted on the basis of Dean Zamuco's "pioneering efforts in forestry in the Philippines and for a long and distinguished forestry career, exemplary service to forestry education in the country, and being an excellent role model for young foresters."

1938

H. Osgood (Red) Anderson has been elected a Fellow of the Society of American Foresters.

1941

J. Willcox Brown and **Hank Kernan** reminisced at the Brown family gathering in October about their days at the Forestry School. In his toast to Hank, Will made up a limerick to the tune of "Blest Be the Tie That Binds" that went as follows:

*Our Kernan Forester Hank
Whose opinions seldom are blank
In Woodlands, N.Y., Tells us all why
We should know that our trees are the Bank.
Hank's children surely do thrive;
They're glad the Old Man is alive.
With offspring so numerous
Best note what is humorous.*

Will and wife Natalie also were honored for their life-long dedication to volunteer work in late May. The trustees of the University System of New Hampshire honored the couple with a Granite State Award, which is an award given annually to foundations, corporations or individuals for extraordinary service to the state or communities. A partial list of organizations they have championed includes the

Society for the Protection of New Hampshire Forests, the Audubon Society of New Hampshire, the New Hampshire Association for the Blind, the Currier Gallery of Art, the state's Electric Energy Review Committee, the Robert Frost homestead and the Democratic National Committee. Recently Will and Natalie hosted Brazilian professionals as part of the Partners of the Americas project, which helped locate underground water resources in Brazil, a nation often plagued with drought.

Ingy Arnold writes that the class of '41 fully realize that the class of 1928 would be proud to have Will Brown as a member of their class but they refuse to release him (*page 13 of Centennial News Fall/Winter 2000/01*).

1942

John Gray's wife, Mildred, died in Little Rock on March 21. They were married 57 years.

1943

Last August, members of the class of 1943: **Perk Perkins**, **Dave Leavenworth**, and **Hap Mason**, along with spouses and relatives, got together in Wallingford, Conn., for the annual Ye Olde Cabin Association meeting. Perk, Dave, Hap and the late **Geoff Kilpatrick** built Ye Olde Cabin in 1940 as a refuge from New Haven. Hap astounded the gathering with his diving prowess in the rockbound swimming hole, while live Cajun music also entertained the guests. Geoff's daughter Jean, son David, and granddaughter Ellie all attended the festivities. Ellie had just returned from a summer session at Yale, continuing a family legacy; her father, mother, grandfather, and great-grandfather were all Yale graduates. Absent from the gathering was Hap's oldest son David, who returned to Russia to adopt a third child, Svetlana, with his wife Val. Hap, who owns the Moss Hill Tree Farm, was named Massachusetts Tree Farmer of 2001.

1947

Evert Johnson, now retired from the forestry faculty at Auburn University, is the author of *Forest Sampling Desk Reference*, published by CRC Press.

1951

Robert R. Lindahl and **Harry E. Hopkins '52** are now Golden 50-year members of the Society of American Foresters.

1953

Perry Hagenstein is a member of the National Research Council's Board on Agriculture and Natural Resources. Perry also served on several NRC committees concerning Pacific Northwest forest management, valuing biodiversity and regulating hardrock mining on federal lands.

George Tsoumis is researching the forest situation in ancient Greece (and the region). This has produced papers, such as "The Depletion of Forests in the Mediterranean Region: A Historical Review from Ancient Times to the Present," "Gods and Forests in Ancient Greece," "The Forests in Homer's Odyssey," "Degradation of the Environment in Ancient Greece," and "The Beginning of Wood Science." Also, on the basis of palaeobotanical and palaeontological findings (petrified remnants), he wrote a paper on the existence of tree species, such as Sequoia and Taxodium in northern Greece (now only in the U.S.), and a jungle situation with elephants, rhinoceros and hippopotamus about 20 million years ago.

1954

W.E. Reifsnyder (Ph.D.) was elected a Fellow of the American Meteorological Society.

Harry G. Spencer traveled to Thailand earlier this year, where he met up with long-time friend and classmate **Chote Raktiprakara**. The two had not seen each other in 47 years, but they had a wonderful time reminiscing and spending time with Chote's wife, grandson, and nephew Danny. Harry reports that Chote is in excellent shape; he has retired from teaching wood products at the University in Bangkok, and "still has that aura of friendliness and good cheer." Chote shared his stories of other old friends with Harry. Over the years, other Yale alumni have visited him, including **Ben Jayne '53**, **Charlie Walters '57**, **Arthur Westing '54**, **Christien Skarr '54, Ph.D. '57**, and **Bob Young '54**.

ClassNotes

1958

Jack Vimmerstadt is chairman of the Ohio Society of American Foresters.

Everett B. Peterson and his wife **Merle (Yale MAT '59)** continue to run Western Ecological Services Ltd., a consulting company located in Victoria, British Columbia. Clients have included many federal and provincial forestry or environmental agencies, the petroleum pipeline industry, aboriginal groups, and environmental non-governmental organizations. In terms of research, the company's specialization has been the ecology of western North American broadleaf tree species. Everett and Merle have a daughter, Michelle, and a son, Bruce, who with his wife, Amy, and two daughters, live in the Columbia Gorge National Scenic Area at Hood River, Ore.

Bill Rogers reports that he has been practicing urban forestry and arborist consulting for the past six years at Scientific Tree Care of Tallahassee, following his retirement from Champion in 1987 and the Florida Department of Agriculture and Consumer Services in 1995. He frequently sees classmate **Selmer Uhr** at the Society of American Foresters and ISA conferences, which they regularly attend.

1959

After **Don Girton** retired from the U.S. Forest Service, he became the founding president and chief editor for the Kentucky Woodland Owners Association but has now relinquished these responsibilities as well.

John Asmah is supporting his wife, Hon. Mrs. Gladys Asmah, in her campaign for a parliament office in Ghana. After looking through back issues of the *Forest School News*, he is anxious to contact old colleagues from the summer camp.

George Bengtson Ph.D. '61 retired last July after serving as associate dean of the School of Forestry and Wildlife Sciences at Auburn University.

Hans T. Bergey has been elected a Fellow of the Society of American Foresters.

1960

Pete and **Kay Hannah** have finished their retirement home on the Maine coast. In late winter they went skiing in Switzerland and then warmed up in Malaga, Spain. Pete has started some consulting work.

1961

Lee Miller, for many years editor-in-chief of *Ecology* and other scientific journals of the Ecological Society of America, received the 1999 Distinguished Service Award of the Council of Biology Editors in recognition of his long efforts in organizing the Council's educational activities.

L. Keville Larson, chairman of Larson & McGowin, Inc. Forest Managers and Consultants of Mobile, Ala., was named president of the Forest Landowners Association last May during the Forest Landowners Conference in Alexandria, Va.

1962

Dale S. Solomon has been elected a Fellow of the Society of American Foresters.

1963

Mike Whitney lives on 165 acres in Pownal, Maine.

1964

Ken Mitchell continues to lead the tree-growth modeling research of the British Columbia Ministry of Forests, which is beginning to find application in the partial cutting regimes starting on the Crown Lands. The consulting services of **Robert M. Kellogg '54** are sometimes involved. **Catherine Bealle Statland '90** is one of the members of the research group. Ken recently remarried; his wife, Jean, is secretary to the director of the British Columbia Forests Research Branch.

1965

Timothy La Farge retired last year after 35 years in the United States Forest Service and now lives in San Francisco. From 1965 to 1982, he was involved in genetics research for the Southeastern Station at Macon, Ga., and earned

a doctorate in forest genetics at Michigan State in 1971. In 1982 he transferred to assignments in the headquarters of the USFS Southern Region in Atlanta.

1966

Alden "Denny" Townsend was profiled in the summer/fall 2000 issue of Penn State Agriculture for his work as lead researcher in the United States Department of Agriculture effort to save the American elm. His contribution is described by a tree geneticist as having "developed resistant American elms that retain the classic vase shape with overarching limbs." He has been on the case for more than 25 years, the last 16 years at the USDA's National Arboretum in Maryland.

1968

Keshab Pradhan and **Robert C. Ellis** recently met in Sikkim where Keshab is retired from government service. However, he heads the Sikkim Development Foundation, which encourages ecosystem conservation, tourism and enterprises at the village level. His wife, Shanti, is also head of a non-governmental organization, the Sikkim Womens Council. Bob is forestry consultant to the Asian Development Bank in the Sunderbans of Bangladesh. His wife, Mary, is a practitioner of alternative medicine in that region.

1970

Keith S. Jennings is moving to the Parks & Wildlife Service within the Environment Protection Agency in Queensland. He also keeps in touch with fellow F&ES graduates in Australia including **Ted Mannion '63**; **Ian Ferguson '63, Ph.D. '67**; **Eric Bachelard '59, Ph.D. '62**; **John Fryer '69, Ph.D. '82**; **Bill Neilsen '69**; **John Duggin '69, Ph.D. '84**; **Ron Wilson '71**; and **Hans Drielsma '78, Ph.D. '84**. Last year he met up with **Hans T. Bergey '59** who was with the Society of American Foresters tour to Australia and New Zealand. In 1999 he hosted **Tom Nygren '71** and his wife Pat during their trip to Australia.

Chadwick Oliver is Pinchot Professor of Forestry and Environmental Studies at F&ES.

ClassNotes

Whitney Beals is a land protection specialist and organizes conservation easements on forest lands for the New England Forestry Foundation. Previously he had been a consulting forester and had worked for the Nature Conservancy and the state of Connecticut.

Jon Wellner is on the faculty of the Department of Statistics at the University of Washington.

1972

Robert Hart has retired as forester in charge of the Eli Whitney Forest of the South Central Connecticut Regional Water Authority (formerly New Haven Water Company) after 29 years in that position. Many alums recall working in this forest when Professor **Pop Hawley '04** was the forester and the land was covered with young cut-overs or old fields. Bob plans now to do consulting forestry.

John C. Welker is vice president of Canal Forest Resources, a forest management consulting firm. He was previously woodlands technical services manager for Mead Corporation's Coated Board Division.

1974

Peter Seligmann, chair and chief executive officer of Conservation International, has joined with James Wolfensohn, president of the World Bank and Mohamed El-Ashry, head of the Global Environment Facility, to create the Critical Ecosystem Partnership Fund as announced in the *International Herald Tribune*. The aim of the partnership is to raise \$150 million for civil society groups working to protect biodiversity in 25 hotspots worldwide, where 60 percent of all terrestrial species are found. These hotspots make up just 1.4 percent of the Earth's total surface. The object is to help agencies and communities pull together and have a greater impact by providing information about what others are doing, while underwriting crucial activities that otherwise would not be funded. Grant guidelines are available on the Internet and applications can be submitted online.

Spencer Beebe is the president and founder of Ecotrust, a non-profit organization, based in Portland, Ore., which promotes economic development and environmental protection.

Ecotrust has converted a century-old warehouse in Portland into an office-shopping complex, Natural Capital Center, for various environmentally oriented enterprises. Ecotrust is also a founding partner in ShoreBank Pacific, which promotes environmental conservation and economic development in the Pacific Northwest.

1975

Jacqueline Russell is an attorney with the Office of Attorney General representing the Maryland Department of the Environment, handling enforcement actions against those who violate Maryland's environmental laws. She would love to hear from classmates and others in the Baltimore/Washington area.

Steve Levy is enjoying early retirement, spending his time as a substitute pre-school teacher. He writes, "Where else can you go to work and get hugs and kisses from people who tell you that they love you?" His travels continue as well. In November he visited China and Tibet, hiking through the Yangtze River's Tiger Leaping Gorge, the deepest on Earth.

Anne Fege of the Cleveland National Forest in San Diego is chairman of the Society of American Foresters working group on Wilderness Management.

Douglas Ryan is doing watershed research for the USFS in Washington, D.C.

1977

Sharon T. Friedman has been elected as a Fellow of the Society of American Foresters.

1978

Professor **Gary Machlis** of the University of Idaho recently received the Conservation Service Award of the U.S. Department of Interior for his studies of sociology and administration of the national parks.

1979

Bobby McKinstry, Jr. has been appointed to a three-year full professorship as the Maurice K. Goddard Chair in Forestry and Environmental Resources Conservation at Penn State. His time at Penn State will focus primarily on environmental and natural resource law and public policy issues, as well as teaching, writing, researching and speaking.

Bobby will maintain an "Of Counsel" position at Ballard Spahr during his Penn State appointment. He can be reached by email at rbm10@psu.edu.

Clark Binkley is chief investment officer of the John Hancock Timber Resource Group in Boston.

1980

Last May, **Sara Schreiner Kendall** was appointed vice president of Environment, Health, and Safety division of the Weyerhaeuser Company. Sara began working for the company over 20 years ago in the Timberlands and Wood products organizations. After earning her law degree, Sara returned to Weyerhaeuser's law department. She later joined the company's Environment, Health and Safety organization where she served as director of regulatory and public policy before accepting her new role.

V. Alaric Sample has been elected a Fellow of the Society of American Foresters.

1981

Martha Davis is manager of strategic policy development at the Inland Empire Utilities Agency, a municipal agency which provides wastewater treatment services and wholesale imported water supplies to the Chino Basin along the Santa Ana River, east of Los Angeles.

1982

The work of **Kent Wommack**, vice president and executive director of the Nature Conservancy's Maine chapter, was profiled in the February Customer Guide, which is published by Central Maine Power. The utility's parent company started last year with a gift of \$250,000 to the chapter's St. John River Project. The gift added to the \$35 million raised for the purchase of 185,000 acres along the upper St. John River in northern Maine. Thanks to **Jen O'Hara '94, Ph.D. '99**, for the report on Kent.

Timothy Gregoire '82, Ph.D. '85, J.P. Weyerhaeuser Professor of Forest Management at F&ES, was named Fellow of the American Statistical Association during the ASA presidential address at the Joint Statistical Meetings last August. He also received the Council of the Society of American Foresters Award in Forest Science for 2000.

ClassNotes

1983

Steve Blackmer is president of the Northern Forest Center, an organization devoted to the conservation and management of the forests of northern New England and New York.

Ian Cameron is a consulting forester in the firm of James Thrower & Associates in central British Columbia, but continues some stand modeling research with the Ministry of Forests in Victoria.

Mary Ann Fajvan of West Virginia University is secretary of the Society of American Foresters Silviculture Working Group.

1984

After 11 years of living and working in Costa Rica, **Dr. Eva Müller** left her post as principal technical adviser of GTZ to the COSEFORMA Forestry Project on March 31 to be assistant director for reforestation and forest management for the International Tropical Timber Organization (ITTO) in Japan. Her new contact information is available through F&ES' database.

1985

Bob Clausi is currently based in Asmara, Eritrea, where his wife is posted with the United Nations peacekeeping mission for 12 to 18 months. He looks forward to learning Italian.

Nora Devoe visited F&ES in August while on a sabbatical leave from the faculty of the School of Forestry of the University of Canterbury in Christchurch, New Zealand, where she teaches courses on the silviculture of natural forests in New Zealand, Southeast Asia and the Western Pacific. She has been studying the management of Maori-owned forests of Antarctic beech and podocarps on the South Island.

Louise de Montigny heads a group that is doing research on alternative silvicultural systems on Vancouver Island for the British Columbia Ministry of Forests.

1987

Jim Pissot has moved from the National Parks Conservation Association to the Yellowstone to Yukon Conservation Initiative, which "helps wildlife cross the road." Y2Y will maintain and restore wildlife core areas and corridors from Wyoming's Grand Teton National Park to the Arctic Circle.

1988

Margaret Kneller is professor on annual contract at the Dipartimento Scienze della Terra, Università di Siena, Italy. She is teaching introductory geography and climatology in Italian. She also is conducting research in paleoclimate and vegetation, but will be shifting the emphasis more to human degradation of the landscape before the industrial revolution.

1989

Mary Robbins retired in March 1999 from the Massachusetts Water Resources Authority after her third child was born. She is now serving as editor of the Boston Harbor Project "Archive project." She loves being home with her three young children and has much more time to spend with her husband, family and friends.

1990

Ann Camp joined the non-ladder faculty at F&ES as a lecturer in stand dynamics and forest health (see story on page 42).

1991

Margo Burnham recently changed positions within the Nature Conservancy; she is now the Chile program director.

A reunion in Estes Park, Colo., brought **Deb Beardsley**, **Margo Burnham**, **Yance de Fretes**, **Helmut Gieben**, wife Laura and 4-year-old son Carl, **Sean Gordon**, **Jennifer Greenfeld**, **Suzy Hodgson** and husband Mike, **Chip** and **Jill Isenhardt**, 8-month-old son Jesse, and 2-year-old daughter Hannah, **Erin Kellogg**, husband Rod, and 2-month-old daughter Keelia, **Callie McConnell**, and **Alexandra Teitz** together for a weekend of reminiscing, hiking, photos, beer and games.

The group stayed at the YMCA of the Rockies and spent Saturday of the long weekend hiking around Bear Lake, Dream Lake, and Emerald Lake, and Sunday hiking to Chasm Lake with Long's Peak, towering in the background. For pictures and news of classmates, visit the Class of '91's new web site at: <http://clubs.yahoo.com/clubs/yfes91>.

1992

Shawn Dalton is near completion of her Ph.D. as a non-resident student at Johns Hopkins University, and now lives in Sussex (pop. 4,500), New Brunswick, Canada.

Gary Tabor is living in Bozeman, Mont., where he works as an environmental architect, consulting on projects such as Yellowstone to Yukon, the Center for Conservation Medicine, and Mountain Gorilla Trust Fund. His work involves helping non-profit groups in the region with program, science and capacity building needs.

1993

Jon Garen married Nieves Jamart on Sept. 9, 2000, in Gijon, Spain. **Chip Darmstadt** and **Heather Merbs** made the trip to Spain to help the couple celebrate. Chip brought his entire family on the trans-Atlantic journey, including his wife Alisa and sons Brandon, 3, and Sam, 1. Jon's family also made the trip, including his sister **Eva Garen '97**. The couple will reside in New York City (see photo on web site).

Susan Helms left her job at Tellus to attend school full-time last summer. She is finishing her MBA degree and hopes to work in community development, e.g. financing low-income housing and building other support systems in inner-city neighborhoods. She credits Tellus and F&ES' Urban Resources Initiative in helping her understand the connections between sustainability and neighborhood revitalization, and between preserving cities and preventing sprawl. With the support of her fiancé Sean Daley, she is looking for contacts in community development corporations or similar organizations in the Boston area.

Stephen Harrington is working as a watershed planning consultant for the American River Watershed Plan and for other

ClassNotes

small watersheds in the Sierra Nevada Foothills. He and wife Karen live in Auburn and have a 3-year-old boy. He is a full-time dad and part-time consultant from home.

Daniel Newberry is now the senior fisheries hydrologist for the Hoopa Valley Tribe in Humboldt, Calif., after taking two years off to teach computer and politics at a high school and environmental studies and geomorphology at a community college in Ecuador. His current work is divided between hydropower and water policy and managing field projects on the Trinity and Klamath Rivers. He can be reached at dn_cs@hotmail.com.

Eleanor J. Sterling, Ph.D., is director of the Center for Biodiversity and Conservation at the Smithsonian Institution. For the past four years, she has taught classes in conservation biology as an adjunct professor at Columbia University. At the F&ES initiation of doctoral students, she gave the keynote address at the Doctoral Student Research Conference in January 2001.

Margaret Williams is working for the World Wildlife Fund, investigating northern fur seals breeding in the Pribilof Islands in the center of the Bering Sea (see photo on web site).

1994

Shiju Zhou is division chief of planning in Fujian Provincial Department of Science and Technology. The main work of this division is the planning and management of science research and technology innovation projects in Fujian. Before taking the job, he enrolled in the Fujian provincial administrative college to study public management.

Yosuke Abe became a dad in April 2000. His son's name is Kazuma.

Jessica Eskow lives in Savannah, Ga., and is manager of forest environmental programs for International Paper. She works on the company's Sustainable Forestry Program, specifically on landscape and biodiversity management.

Maryla Records is an environmental specialist for AATA International, Inc. and is telecommuting for its client, the Overseas Private Investment Corporation (OPIC). Projects include environmental monitoring of a natural gas pipeline project in Bolivia and

Brazil, as well as a new internet business (<http://www.quixtar.com>). She moved from Washington, D.C., to Alabama to be with her elderly parents, and she is still happily married to Andy Records.

Despite reports to the contrary in the Fall/Winter 2000/01 *Centennial News*, **Jessica Bennett Wilkinson** is not living in Savannah, Ga., working for International Paper. She and her husband moved to Pennington, N.J. in 2000, and she directs the Environmental Law Institute's State Biodiversity Program as a senior science and policy analyst in Washington, D.C. In July 2000, Jessica and Eric became the proud parents of Joshua Max.

Jane Calvin has been back to F&ES twice over the past year in her capacity as AYA representative of F&ES.

Greg Corbin and his wife Meg are the proud parents of Tyler William Corbin, born last May 13.

Bill Keeton lives in Burlington, Vt., and is a professor of sustainable forest ecosystem management at the University of Vermont.

Felton Jenkins was in Kamchatka, Russia, in September with **Guido Rahr '93** and **Spencer Beebe '74**. Felton is a finance manager for Forestlands International in Seattle.

Ted Wong has finished his Ph.D and moved to Tallahassee to start a computational biology postdoc at Florida State University, studying plant architectural development.

Mary Jensen is an instructor with the National Outdoor Leadership School in the Wyoming, Southwest and Alaska branches.

Scott Matthison has opened a veterinary practice in downtown Toronto. In November, his wife Kelly Donnin gave birth to their first child, Jasper.

Rajesh Thadani has returned to India, where he and his wife Ritika were married on Jan. 19, 2001. Rajesh is executive director of the Central Himalayan Rural Action Group, a developmental non-governmental organization, based just south of Nepal.

Fabio Vancini works on institutional and policy development as applied to urban and industrial environmental management in countries throughout the world with Fichtner Consulting & IT in Germany.

Cynthia Wood received the 2001 Mollie H. Beattie Young Forester Leadership Award of the New England Society of American Foresters. This award is in recognition of her efforts in forest management on private lands for the State of Massachusetts and various land trusts. She recently joined the staff of the New England Forestry Foundation and helped organize the conservation easement that the foundation has acquired on the 750,000-acre holdings of the Pingree Forest Partnership in northern Maine.

Keith Moser of the Missouri Department of Conservation is chairman of the Society of American Foresters Forest Ecology Working Group.

1995

Adam Moore, his wife Melissa and their three-year old daughter Madeleine, welcomed Isabel Kathleen to the world on June 23, 2000. Isabel was born at the Martha's Vineyard Hospital in Oak Bluffs, Mass. Adam is executive director and forester of the Connecticut Forest & Park Association after serving as land superintendent for the Martha's Vineyard Land Bank Commission.

Charles J. Kara recently published his book *A New Look at Culture and Nature Conservation in Africa*, which details the activities of the East African Environmental Network, a non-profit group from 10 different nations which attempts to fight against the severe threat to Africa's biological resources. Charles has held two positions of leadership in Africa and is the vice president and executive director of ECAEI Inc. He is also an instructor in environmental science at Calhoun Community College in Alabama.

Jody Rowlands has moved closer to Jamaica in southern Vermont (closer to the ski slopes!) and has a teaching position in Bennington. For several years she had been the manager of Connwood Foresters, Inc., in Connecticut.

1996

Bryan Foster signed a book contract and is the editor/writer for *The Forest Trust/Forest Stewards Guild* in Santa Fe, N.M.

Lloyd Raleigh returned from the Indian Himalayas, after the National Outdoor

ClassNotes

Leadership School mountaineering course in which he was participating was cancelled due to the terrorist attacks on the United States. Lloyd heard of the tragedy via a messenger dispatched to the mountain valley in China where he was camped near the Tibetan border. When the group arrived in India, they felt the compassion of the people there expressing their sorrow and praying for America. The group was able to spend only one night at the base of the Pindari Glacier at 12,000 feet, originally intended to be their base camp. This one night among mountains soaring another 12,000 feet above him, though, fueled Lloyd's desire to someday return to Asia and the Himalayas.

He returned home to work after an arduous journey of five days hiking, one day of jeep travel, 18 hours by car, and two days of flying.

Alison Sarmac traveled to Rome for a two-week vacation in August and ended up with a temporary work contract at the FAO headquarters. As her appointment terminated at the end of September, she was looking for another short-term contract in Italy in order to continue working on her Italian language skills.

Mike Toffel married Erin Deemer on Sept. 2, 2001, in Indianapolis (see photo on web site). Other F&ES alumni in attendance included **Kristin Steck '95**, **Heinrich Jessen '95**, and **Colleen (Coyle) Mathis '95**.

1997

Gerry Lee is in Kota Bharu in Kelantan state from Taman Negara (National Park) in Pahang, Malaysia. She's seen her fair share of leeches and will head to Perhentian Islands before going to Thailand.

The CSA Group, Inc., of San Juan, Puerto Rico, has named **José Terrasa-Soler** the manager of the environmental business unit. CSA is the largest Hispanic consulting firm in the U.S., offering services in engineering, architecture and environmental sciences. José is responsible for all of the environmental services in the business unit offered, including environmental engineering, sciences, and permitting and compliance.

1998

Tormod Dale is working for Prevista, a natural resources consulting company owned

by the Norwegian State Forest Corporation and Viken Forest Owner Association. Tormod will most likely be accepting assignments in Kosovo and Uganda in the near future. Previously he was stationed in Pristina, Kosovo, as the project manager for the FAO Forestry Emergency and Rehabilitation Project.

Bruce Hammond is now working in Boston for Environmental Defense as a project manager for their corporate partnership project, the Alliance for Environmental Innovation. The focus of this project is to work with companies on environmental issues, such as using recycled packaging and ensuring a sustainable seafood supply.

Joe Taggart is a forester in the Timberland Department of Land Vest, based in Concord, N.H. He and his wife, **Wendy Barber**, reside in New Boston, N.H.

1999

Rajini Ramakrishnan is a project manager for ATC Associates. Before ATC, he was a copy editor for an internet company in Princeton. He traveled to India for a month of vacation between jobs and is currently enjoying New York City.

Marty Kearns was selected to launch Green Media Toolshed in May 2000 after founding and serving as executive director of the Georgia River Network, an Atlanta-based conservation group dedicated to the conservation of Georgia's rivers. Previously he managed fisheries conservation programs for over 160 projects scattered across 13 western states for three years for the National Fish and Wildlife Foundation.

Eva Cuadrado, Ph.D., and husband Chris Worden were recently honored at the Connecticut chapter of the Northeast Organic Farmers Association in recognition of their efforts for the advancement of organic agriculture in Connecticut.

Jennifer Garrison recently left the University of Kansas to teach high school biology and environmental science at the Marlborough School, an independent school in Los Angeles.

Hilary Stevens left for the Peace Corps in March 2001. She will be working on coastal resource management in the Philippines.

Radhika Wijetunge is enjoying her doctoral work with the Program in Water Resources and Environmental Engineering at Princeton. She was recently awarded a NASA Earth Science Fellowship which provides funding for her Ph.D. research.

Andres Kulmatiski is one of 20 young academics nationwide to be awarded the prestigious Switzer Foundation Environmental Leadership Award. Andres is a Ph.D. candidate in environmental studies and ecology at Dartmouth College. The project for which he was awarded this fellowship involves developing a management organization to consult with both private landowners, as well as federal agencies on methods to control invasive species using ecologically viable means. His current project in Washington State investigates a soil-based method of controlling these invasive species.

Editor's Note: **Phil Johnson** is not now, and never has been, a class agent for either the Class of 1999 or the Class of 2000. Sorry for the confusion, Phil.

2000

Elise Granek is co-editor of the recent booklet, "Biodiversity: Connecting with the Tapestry of Life," published by the Smithsonian Institution's Monitoring & Assessment of Biodiversity Program.

2001

Diane Russell is a team leader for the International Center for Research in Agroforestry (ICRAF) in Nairobi, Kenya. She is enjoying her new job and writes that she, Benjie, and Eva are moving into a new house with plenty of room for guests. Eva is attending the International School of Kenya.

Alexandra Baillie is in South Africa working for the IUCN, preparing for the World Summit on Sustainable Development. Her focus is on ensuring that South Africa will have a strong platform to present at the summit. The move to the IUCN followed a summer of baboon research in Namibia.

Kim Ziegelmayer gave birth to a 10-pound baby boy, Whelan Lewis Means Ziegelmayer, last August 20.

Obituaries

Togo B. McKeithen, '32, 1906-2001, grew up in Urania, La., in the time when the school's spring field instruction took place there. He was a 1931 forestry graduate of Louisiana State. From 1933-1936 he taught at the University of Georgia. For many years after he was involved in various enterprises, including owning a sawmill and forestland in Summerfield, La. He retired in 1965, lived in Naples, Fla., and later moved to Shreveport, La. His daughter reported that he died there Feb. 1 at 95.

John D. Kendig, '37, 1911-2000, came from Manheim, Penn., and had a 1933 B.S.F. from Penn State. For a few years he was associated with the Otsego Forest Cooperative in Cooperstown, N.Y., and then with the U.S.F.S. Northeastern Timber Salvage Administration in Hartford. In 1940 he returned to Manheim and was a professional orchardist and nurseryman until 1968. He then became a writer and editor for local newspapers. As a leading historian of Manheim and Lancaster County he wrote five books, including a biography of Baron Henry Stiegel. He died there on Dec. 19. His wife, Marguerite, died in 1980. They are survived by a daughter.

Kenneth E. Jones, '38, 1912-2001, was a 1934 graduate of the University of Maine and came from Bangor. During World War II, he was a Lt. Cdr. on the aircraft carrier Belleau Wood. In 1948 he became the forester of the New England Forestry Foundation in Berkshire County, Mass., and served in that capacity until retiring in 1988. He lived in Tyringham and died there on May 28. His wife, Alberta, died in 1985. They are survived by two children.

Charles A. Wellner, '38, 1911-2001, grew up in Twin Falls, Idaho, and was a 1933 forestry graduate of the University of Idaho. From 1933 to 1973 he was in U.S.F.S. research as a silviculturist and administrator at the Northern Rocky Mountain Intermountain Forest Experiment Stations. During World War II he was Navy weather officer in the Pacific. His distinguished research in many aspects of forest science brought him many awards, including U.S.D.A. Superior Service Awards, the Oak Leaf Award of the Nature Conservancy, the Chevron Conservation Award, an honorary doctorate from the University of Idaho, and election as a Fellow of the Society of American Foresters. After he retired, he continued for almost 20 years as a volunteer for U.S.F.S. doing much of the leg-work and reporting necessary to locate and set up nearly 100 research natural areas in Idaho. He died in Olympia, Wash., on June 5 at 90. His wife, Ethel, died in 1969. He is survived by three children, Jon Wellner '70, Sandra Wall and Kent Wellner, three grandchildren, and his companion Sonja Lewis.

Zebulon W. White, '38, 1915-2001, who was Musser Professor of Industrial Forestry from 1958 to 1972, died of cancer in Lynchburg, Va., on July 16 at 85. He grew up in New London, Conn., and was a graduate of Dartmouth where he later served on the alumni council. He had a distinguished career as a consulting forester down south. From 1941 to 1958 he was with Pomeroy & McGowin in Monticello, Ark. When he returned to Yale, he taught and ran the industrial forestry seminars, a long sequence of short courses for mid-career people, and was associate dean from 1965 to 1972. He also ran the southern forest management fieldwork each spring, and was secretary of the Alumni Association. In 1972 he returned to his own consulting forestry practice in Hammond, La. He retired in 1990 but remained active in local civic affairs. He had moved to Lynchburg in 1999. Among his survivors are Marjorie "Midge," his wife of 62 years, a daughter, three sons, and 11 grandchildren.

Robert W. Breck, '41, 1917-2000, came from New York and was a 1940 graduate of the University of New Hampshire. After World War II naval service, he became county forester of Hillsborough County in New Hampshire and served there until he retired 1981. In 1988 he and his wife, Doris, moved from Millford to Woodstock, Vt., where he died on Oct. 26. He is survived by his wife, daughter, and two granddaughters.

Robert H. Clark, '42, 1912-2001, came from Minnesota and graduated from the University of Minnesota in 1935, becoming a forestry supervisor in the Civilian Conservation Corps. In 1942 he began a career that lasted 42 years as a forester for the Fordyce Lumber Co., which later became part of Georgia Pacific. He was chief forester there from 1948 to 1977. Many Yale foresters remember his years of association with their work at the nearby Crossett spring field sessions. As a leader in southern forestry, he was elected an SAF Fellow in 1987. He died at Fordyce on Jan. 20. He is survived by his wife of six decades, Ruth, and four children and seven grandchildren.

Paul E. Lachance, '42, 1914-2000, came from Quebec City and received a baccalaureate degree from the Seminaire de Quebec in 1937 and a forest engineer degree in 1940 from Laval University. After Yale he pursued doctoral work in forest economics at the University of Michigan and received his Ph.D. in 1954 in absentia because he had returned to Quebec to start a career as a consulting forester in 1945. He was a partner in a consulting firm and an officer of La Compagnie Photo-Air Laurentides. In 1958 he co-authored "The Outlook for Canadian Forest Industries," a report of the Royal Commission on Canada's Economic Prospects. He then served as president of the Council of Pulp and Paper Producers of Quebec and was active in the Canadian Institute of Forestry. He died in Quebec City on June 7.

John E. Wishart, '46, 1918-2001, came from Massachusetts and held a 1941 B.S.F. from the University of Minnesota. During World War II he was a carrier fighter pilot in the Navy and stayed in the Reserve until he retired as a captain in 1967. His was in the first class to use the Yale Spring Camp at Crossett. He was able to continue his contact with Yale classes because he remained with the Crossett Company and its successor, Georgia Pacific, for the next 32 years. At the end of that period, he was forestry division manager for the western South. In 1978 he moved to Atlanta and for the next five years was Georgia Pacific's vice president for timber and timberlands. He was active in civic affairs and at one time was chairman of the board of the University of Arkansas-Monticello. He retired in 1983 to Panacea, Fla., until ill health caused him to move to Decatur, Ga. He died there on March 8. His wife of 58 years, Marguerite, survives him as well as a daughter and granddaughter.

Lewis P. Bissell, '47, 1918-2000, came from Massachusetts and was a 1940 forestry graduate of the University of New Hampshire. He was in the Air Force during World War II. After a year as Grafton County Forester in New Hampshire, he became State Extension Forester in 1949 at the University of Maine and served there for more than 30 years. During his retirement, he was active in conservation and civic affairs in the White Mountain area. He died in North Conway, N.H., on Dec. 10.

Ralph A. Read, '49, 1916-2001, came from Kansas and was a 1940 forestry graduate of Colorado State. He was in the Soil Conservation Service and in timber harvesting for several years. In 1946 he was assigned to the U.S.F.S. Southern Forest Experiment Station in Harrison, Ark. In 1953 he transferred to the Rocky Mountain Station's branch at Lincoln, Neb. During his decades there he was recognized as an expert researcher on shelterbelts and other aspects of vegetation management in the Great Plains. He was a Fellow of the Society of American Foresters. After his 1979 retirement he moved to Estes Park, Colo. He died on Feb. 1 at 84.

James S. Watson, '49, 1926-2001, came from Idaho and served in the Navy during World War II. He graduated from Penn State in 1948. After Yale he joined the U.S.F.S. and had assignments in Washington, Idaho, and Montana. In 1966 he moved to the Tongass National Forest in Alaska and spent the rest of his career there, serving as supervisor from 1973 to 1975. He retired to Ketchikan in 1982. He died there on Jan. 2 after a long illness. He is survived by his wife, Betti, three daughters, and nine grandchildren.

John M. Bradley, '50, 1925-2001, came from Birmingham, Ala., and served as naval officer in the Western Pacific during World War II. In 1947 he received joint degrees in mathematics and forestry at the University of

Alabama and studied at UC-Berkeley before coming to Yale. He started Resource Management Services, a well-known southern forest management service headquartered in Birmingham, and was its board chairman for many years. At one time he was a member of the Alumni Council Committee. He died in Birmingham on Feb. 10.

Peter Mount, '53, 1930-2000, came from Connecticut and was a 1952 forestry graduate of the University of Maine. He also had a Ph.D. from Colorado State. After military service during the Korean War, he worked in forestry in eastern Tennessee for many years, involved in education, extension and consulting. In 1967, he taught forest economics at West Virginia University. For several years he was on the forestry faculty at Louisiana Polytech. Subsequent to his involvement there, he did state and federal extension work in Alabama, including more than a decade as extension forester at Tuskegee Institute. He moved to Camp in the Arkansas Ozarks in 1998 because of serious heart trouble and died there on Sept. 2. He is survived by his wife.

Elvin T. Choong, '58, 1932-2001, was born in Jakarta, Indonesia, and came to the United States after high school. He received a B.S.F. from the University of Montana in 1956 and, after his studies at Yale, earned a Ph.D. in wood science at SUNY Syracuse in 1962. He taught wood technology at Humboldt State until 1965. He then moved to Louisiana State, where he worked in wood science and tropical forestry. He published more than 150 technical papers, served as a director of the Society of Wood Science and Technology, and was also involved in the visiting scientist program. He received several awards for his research. He was faculty advisor for the Indonesian Student Association at LSU. He also swam competitively and held several senior master-swimmer awards. He died on Feb. 18 of a heart attack while working on a USAID project in Honduras. Among his survivors are his wife, Freida Natawidjaja, as well as a son, daughter and stepson.

Robert B. Fiske, '59, 1933-2001, was a 1956 forestry graduate of the University of Maine. From 1960 to 1970 he was forester for the Bingham District of Scott Paper Co. in Maine. During the next three decades, he became well-recognized for his expert role in guiding the technical forest management services that the James W. Sewall Co. provided in the Northeast. He served on many governing boards and education committees of the city of Old Town and the state of Maine, including acting first chairman of the state forestry licensing board. He became a Fellow of the Society of American Foresters in 1987 and retired in 1998. He died on June 14, and is survived by June, his wife of 43 years, four children and five grandchildren.

John K. Sailor, '80, 1956-2001, was from Long Island and a 1978 graduate of Amherst College. After Yale he worked for two years as a natural resource planner for the New England River Basins Commission. At the time of his death, he was a senior vice president and principal of Genetics, a Boston firm specializing in geographical information sys-

tems, and had worked on projects for Harvard University, airports in Denver, Washington and Hong Kong, as well as major construction activities in the Boston area. Earlier he had been an officer or software manager for similar firms, LaserData, Apollo/Hewlett-Packard, and Intergraphic. He was also an accomplished cellist and had played with Symphony Promusica of Hudson, Mass., where he and Marcia resided from 1987 to 1996. He enjoyed sailing, especially with his family on Block Island. He died in Wayland, Mass., on March 25, and leaves his wife, Marcia Kallgren '81, two children, Carl and Anna, as well as his mother and two siblings.

Steven J. Kohls '86, died suddenly on Aug. 23, 2000, shortly after he moved to Washington, D.C., where he was about to take a position with the Environmental Protection Agency. He had recently completed Ph.D. studies at the University of Illinois. He is survived by his wife.

Andrew Cohen, '93, 1969-2001, died as a result of a mountaineering accident on July 1. On his birthday he attempted to solo Mt. Raupaehu, a 9,000-foot volcano, the tallest mountain on New Zealand's North Island. In 1992, he spent six months studying the autecology of an invasive fern, and tested the potential for its control for restoration ecology purposes in Sinharaja's Man and Biosphere Reserve's buffer zone, Sri Lanka. After graduating with distinction, he worked in Baltimore on an inner-city restoration project. He later taught watershed ecology to at-risk middle-school students. He then worked as a Peace Corps volunteer in Kenya for three years, implementing water and environmental management projects in the rural Vihigi district near Lake Victoria. He also provided critical management input for the Kakamega Forest, the last Kenyan rainforest. Following his tour with the Peace Corps, he stayed in Nairobi and was a project manager with the British firm, Energy Alternatives. In December of 2000, he was accepted as senior scientist in climate change for forest research in New Zealand (see web site for additional text).

FACULTY

Albert C. Worrell, 1913-2000, Edwin W. Davis Professor Emeritus of Forest Policy, died in Nacogdoches, Texas, on October 21. He served on the faculty from 1955 until his retirement in 1983. His primary responsibilities were in the fields of forest economics and policy. He also handled the summer-long field instruction at Great Mountain Forest from 1956 to 1966. He hailed from Pennsylvania, received an M.F. from the University of Michigan, and was an SCS forester in the late 1930s. During World War II he engaged in naval ship-building in Puget Sound. He was on the faculty of the University of Georgia from 1946 to 1955. In 1953 he received a Ph.D. from the University of Michigan. During his years at Yale he also held visiting appointments at universities in Chile, Germany and Australia. His many studies and writings in forest economics and policy included efforts to value forest and environmental benefits. His survivors include two daughters, one son, six grandchildren, and three great grandchildren. His wife, Helen, died in 1999.

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Commentary

New Center to Address Species Extinction



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Oswald Schmitz

“This staggering loss of species diversity and habitat is threatening both the integrity of natural systems and the health of human systems,”
Professor Schmitz.

By Oswald Schmitz, PROFESSOR OF POPULATION AND COMMUNITY ECOLOGY

As we move into the 21st century, humanity is witnessing an unprecedented period of extinction. In the last 20 years, tropical rainforests—which contain over 50 percent of all the plant and animal species found on Earth—have been cleared to 56 percent of their prehistoric cover. Every year, 142,000 square kilometers of tropical forests—an area four times the size of Switzerland—is destroyed. Scientists estimate that a quarter of the world’s plant species could become extinct in the next 30 years if forest habitats are not preserved. And already, scientists estimate that over a third of all bird species have become extinct.

This staggering loss of species diversity and habitat is threatening both the integrity of natural systems and the health of human systems. Directly tied to this global loss of biodiversity is human demographic success. As global demand for natural resources increases and human development encroaches on sensitive ecological habitat, we are faced with the ill-fated consequences of an unrivaled loss of global biodiversity.

Not only does human activity destroy sensitive species and their habitat, unchecked human degradation of the environment produces an onslaught of environmental change, ranging from deforestation to the salination of coastal regions. In addition, this rapid loss of habitat expands the geographical range of infectious disease.

In response to this global threat, the Yale School of Forestry & Environmental Studies (F&ES) last fall launched the Center for Biodiversity Conservation and Science, whose mission is to produce advances in scientific knowledge and use that knowledge to solve environmental problems that exist on a large scale.

The Center continues with the interdisciplinary tradition on which F&ES is founded by bringing to bear a wide spectrum of natural science, social science and policy expertise on contemporary biodiversity conservation issues. The Center draws upon expertise not only from F&ES, but Yale’s new Department of Ecology and Evolutionary Biology (EEB). The Center will serve as a Yale-wide nexus for basic and applied research that can have an immediate relevance for policy.

Grant to Explore Effects of Climate Change on Wildlife

In support of the Center’s mission, the John Noble Foundation has awarded it a grant to explore the effects of global climate change on wildlife species diversity in eight, key U.S. National Parks. There is no denying that global climate change, as a consequence of a doubling of atmospheric carbon dioxide, will lead to a significant alteration of the Earth’s climate and there will be attendant biotic change as a consequence of this warming. One such change is geographical range shifts of many plant biomes. For example, the corn belt of the Midwestern U.S. is expected to shift northward to Canada. The vast boreal forest of North America and Eurasia is expected to diminish as it is forced northward into regions currently occupied by tundra, only to be stopped by the Arctic Ocean. More importantly, these biomes represent critical habitat for a wide range of wildlife species.

Assessments of climate change effects on wildlife biodiversity remain conspicuously limited. This is ironic because society has such a great affinity for wildlife species that it is willing to invest vast sums to buy land and protect them in national parks and protected areas. However, little attention is being paid to anticipating whether or not climate change will enable parks, and more generally protected areas, to meet their mandate.

Under climate
change, the North
American Elk
may lose
93 percent of their
current range...

A recent synthesis of studies modeling climate change effects on wildlife species, which was completed by doctoral student Catherine Burns and me (Burns and Schmitz 2001, in press), indicates that 40 percent of the 37 mammal species for which forecasts have been made are expected to undergo a 70 to 100 percent reduction in current range size, accompanied by a large (50 to 100 percent) increase in new territory. These data indicate that range shifts from within to outside current park boundaries are extremely likely.

However, not all species are expected to be affected equally by climate change. For example, in a previous analysis of climate change effects on selected wildlife species in the continental U.S., another doctoral student, Kevin Johnston, and I forecasted that white-tailed deer distributions will remain stable over much of their current geographic range in the U.S. (Johnston and Schmitz, 1997). In fact, they are expected to expand their range into California and west of the Cascades. Although there is also a high likelihood of range loss in hot desert regions of Arizona, white-tailed deer, in general, should tolerate climate change quite well.

On the other hand, elk are not expected to fare so well. They are forecast to lose 93 percent of their current range with little or no prospect for recovery elsewhere within the continent. This result is quite poignant. The North American Elk is the “queen of the North America deer species.” It is emblematic of such natural treasures as Yellowstone National Park and Jackson Hole, Wyo. The motivation for the Noble-funded project is to ascertain how many other mammal species within parks in the U.S. will face the same fate as elk, as opposed to the fate of white-tailed deer.

The difficulty in doing this kind of work is that it is impossible to use science’s long-standing, time-tested tradition of conducting careful experiments that provide strong scientific proof on which policy can act. So there will be uncertainty about the true effects of climate change. Moreover, it is impossible to conduct experiments on the scale at which climate change will manifest itself. Our only recourse, then, is to conduct simulations using computational models that build in empirically validated principles of that branch of biophysical ecology that deals with climate affects on species on a local scale. Once calibrated and linked with models of global climate change, these simulation models can make fairly reliable forecasts of likely future events. The proof here will never be iron-clad. However, our natural heritage will certainly be impoverished if our forecasts are accurate and we do not act now while we still have a chance. The Noble Foundation-funded work will help us to reduce uncertainty about the extent and magnitude of climate effects on wildlife species diversity.

The Center for
Biodiversity
Conservation
and Science
has four main
advance
research areas:

ECOLOGY AND CONSERVATION, F&ES Professors Mark Ashton, Professor of Silviculture and Forest Ecology; Lisa Curran, Associate Professor of Tropical Resources; David Skelly, Associate Professor of Ecology; and Oswald Schmitz, Professor of Population and Community Ecology, as well as Stephen Stearns, Edward P. Bass Professor of Ecology and Evolutionary Biology.

CONSERVATION POLICY, Timothy Clark, adjunct F&ES Professor of Wildlife Ecology and Policy.

SYSTEMATICS AND CONSERVATION GENETICS, Adalgisa Caccone, Senior Scientist in Ecology and Evolutionary Biology; Michael Donoghue, G. Evelyn Hutchinson Professor of Biodiversity; Jeffrey Powell, Professor of Ecology and Evolutionary Biology; and Anne Yoder, Associate Professor of Ecology and Evolutionary Biology.

HUMAN DIMENSIONS IN THE CONSERVATION OF BIODIVERSITY, Stephen Kellert, Tweedy/Ordway Professor of Social Ecology at F&ES.



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