

ISSE indicator

News from UT's Institute for a Secure and Sustainable Environment

ISSE SHAPES SUSTAINABLE RESEARCH AGENDA

ARTICLE BY: RANDALL GENTRY



Sustainability, a term still fairly new to the lexicon, defies a tidy definition in part because it can be applied to virtually every aspect of human activity and thus encompasses the complex interaction among economic, social, and environmental factors. Perhaps the best working definition of the term is derived from the 1987 report titled *Our Common Future*, also known as the Brundtland Report. The report identifies sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

We now know that our development patterns, our exploitation of natural resources, our seemingly insatiable demand for energy, and the growing disparity between rich and poor nations are inextricably linked and, together, will shape the world we leave behind for those who follow.

Garret Hardin, in his 1968 essay for

Science titled “Tragedy of the Commons,” addresses the inequitable distribution of the planet’s resources. Hardin argues that the self-interested “haves”—including the United States and other rich, developed countries—profit most from consumption of common though finite natural resources like fossil fuels. Meanwhile, the



DAVID BRILL

ISSE's Director
Dr. Randall Gentry

environmental burdens that result from that exploitation—among them pollution and global climate change—are shared by all of the world’s peoples, including the “have-nots.”

To illustrate, according to the U.S. Energy Information Administration, in 2004

the United States consumed 22.5 percent of the global energy supply but boasted only 4.6 percent of world’s population and produced a mere 15.9 percent of the world’s energy.

In Hardin’s widely shared view, continuation of current policies and practices is clearly not sustainable and will, if unaltered, pass on a legacy of overtaxed eco-

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INSTITUTE FOR A SECURE AND SUSTAINABLE ENVIRONMENT isse.utk.edu

The University of Tennessee’s Institute for a Secure and Sustainable Environment (ISSE) seeks to promote development of policies, technologies, and educational programs that cut across multiple disciplines, engage the university’s research faculty and staff, and grow in response to pressing environmental and security issues facing the state, the nation, and the globe.



The University of Tennessee is an EEO/AA/Title VI/Title IX/Section 504/ADA/ADEA institution in the provision of its education and employment programs and services.

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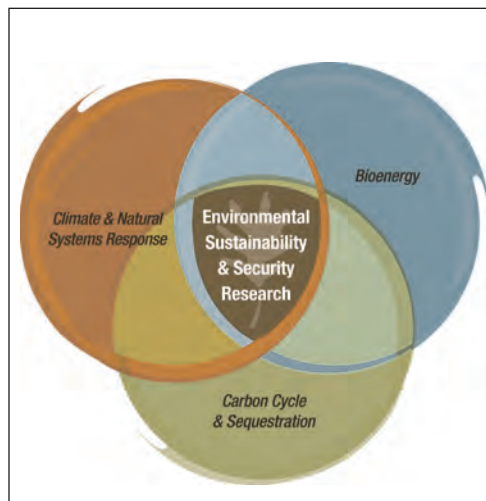
logical systems, polluted air and water, dire poverty, and a critical shortage of nonrenewable natural resources.

We at ISSE are determined to capitalize on our science and public policy skills to help ensure that future generations inherit a healthy—and sustainable—planet. Science provides us with powerful tools for understanding the complex interrelationship between human behaviors and limited, fragile natural systems. Public policy affords us the opportunity to encourage practices that sustain, rather than degrade, the natural environment. ISSE scientists have operated successfully in these research areas for more than 30 years.

The National Academies have recognized this important area of research and formed a Roundtable on Science and Technology for Sustainability, housed within the Policy and Global Affairs Division.

In harmony with the National Academies' efforts, we at ISSE have identified a nexus where our sustainability science and policy agenda can thrive and have the greatest impact. It exists at the convergence of three of the more critical factors influencing environmental health and sustainability: the carbon cycle and carbon sequestration, climate and natural systems response, and renewable bioenergy. These three foci, like all elements of sustainability, are themselves closely linked.

Climate and natural systems respond to such adverse impacts as landscape fragmentation, intensive agriculture, deforestation, and extraction and use of fossil fuels. Current emissions of greenhouse gases—chiefly carbon dioxide—



ISSE focuses its research efforts at the convergence of climate and natural systems response, bioenergy, and carbon cycle and sequestration.

are the major contributor to global climate change, and combustion of fossil fuels is the primary source of these gases. As global carbon dioxide emissions increase and more and more of the Earth's forested lands are cleared, fewer trees and other woody plants are available to absorb and store airborne carbon.

But there are other natural “sinks” for capturing atmospheric carbon dioxide, including oceans and soils. ISSE will explore this dynamic relationship by focusing on efforts to enhance the planet's ability to capture and store carbon dioxide, thus removing it from the atmosphere. In pursuit of that goal, we will seek a deeper understanding of how natural systems—including climate—respond to adverse human impacts. We will also explore policy measures that discourage wasteful and destructive practices and encourage adoption of sustainable energy resources and development patterns.

Continued large-scale combustion of fossil fuels is, by any metric, wholly unsustainable. Bio-based fuels like ethanol and biodiesel will, in time, begin to supplant fossil fuels as our major source of energy. Domestically

produced biofuels—along with other renewable forms of energy like solar, wind, and geothermal—will help the nation reduce its dependence on foreign sources of oil and spur the development of new sustainable industries.

Though few would dispute the fact that biofuels are—or ultimately will be—environmentally preferable to the fossil fuels they replace, these fuels currently are not fully sustainable. In some cases—for instance, in the use of switchgrass, poplar trees, and corn stover as

sources for cellulosic ethanol—production of these fuels uses more energy than it produces when burned. In other cases, conversion of arable lands from food to fuel production—chiefly by diverting corn from the table to the fuel tank—can threaten global food supplies. In yet other cases, cultivation of monocultures—like corn, poplar trees, and other biofuel feedstocks—can compromise the diversity and health of natural ecosystems.

The state of Tennessee and the federal government have invested millions of dollars in R&D focused on producing a sustainable supply of bio-based fuels, and ISSE will do all it can to support and contribute to that effort.

But concerns over a sustainable energy supply are global in scope, and efforts to resolve them must engender international collaboration. With that in mind, ISSE co-hosted a workshop in September that brought together scientists from the Chinese Academy of Sciences and researchers from ISSE, the University of Tennessee, the Joint Institute for Biological Sciences, and Oak Ridge National Laboratory.

“Environmental Aspects of Bioenergy Production and Sustainability” repre-

sents the latest activity of the China-U.S. Joint Research Center for Ecosystem and Environmental Change. (See related story, “Natural Gas,” on page 12.) The center, launched in July 2006, creates a collaborative framework for scientists from participating organizations to capitalize on shared resources and research knowledge.

Over three intensive days, participants explored improved processes for converting lignocellulose to ethanol and examined the unintended environmental impacts that result from current biofuels production.

We will report on the activities of this new center as they evolve. Meanwhile, we invite you to peruse this edition of the *ISSE Indicator*, which highlights the efforts of our research team to pave a path toward sustainability on diverse but complementary fronts. As always, we welcome questions about our institute and its research focus as well as opportunities for collaboration. 

Randall Gentry is director of the University of Tennessee’s Institute for a Secure and Sustainable Environment.

WATER ACT COULD FUND VITAL UT RESEARCH

The Water Resources Development Act (WRDA), passed by the U.S. Congress in September, authorizes funding of \$2 million for the University of Tennessee (UT), Knoxville, for operation of the Southeastern Water Resources Institute (SWRI).

SWRI, which is housed in UT’s Institute for a Secure and Sustainable Environment (ISSE), is a multi-disciplinary, multi-institutional research entity devoted to the study of issues related to surface and ground water.

SWRI would use the funds to study sustainable development and utilization of water resources in the southeastern United States.

President Bush vetoed the bill, but Congress overrode his veto early in November, marking the first congressional override of a presidential veto in 10 years.

“The Southeast, long regarded as water-rich and immune to some of the issues that have plagued the more arid West for decades, must be proactive in effecting essential improvements to its infrastructure and ensuring the long-term quantity and quality of its water supply,” says Randall Gentry, ISSE director and associate professor in UT’s Department of Civil and Environmental Engineering. “This bill authorizes projects that will help our region, and the nation, achieve those goals.”

WRDA authorizes funding through the U.S. Army Corps of Engineers for flood control, improvement to wastewater systems, dredging of U.S. ports, and protection of the nation’s water supply through environmental restoration.

“If we do not invest in new water infrastructure projects and maintain the ones we have, we will be looking at a much bigger price tag down the road,” said Congressman John J. Duncan, Jr. (R-TN), who supported the bill. “You have to look no farther than the aftermath of Hurricane Katrina to see the economic damage caused by not investing in our flood control projects—not to mention the loss of life and property.”

Several of the other projects authorized by the act will directly benefit East Tennessee.

While the bill authorizes these projects, money for the projects will have to be appropriated by Congress during the fiscal year 2009 appropriations cycle.



DAVID BRILL

PARTNERS IN CLEAN

ISSE’s Catherine Wilt (center) receives a 2007 Governor’s Environmental Stewardship Award for her efforts to make Knoxville’s Sundown in the City concert series and annual EarthFest zero-waste events. Pictured with Wilt are partners in the effort Tom Salter, executive director of Keep Knoxville Beautiful (left), and John Homa, Knoxville’s solid waste specialist. Wilt and Salter received a grant from the U.S.

Environmental Protection Agency to adapt the waste-reduction process created for EarthFest 2006 and Sundown into a Zero-waste Event Guide for use across the Southeast. The 2007 Earthfest hosted 14,000 people but produced only about 925 pounds of waste, of which only one 25-pound bag went to the landfill. Some 460 pounds of waste were composted and 440 pounds were recycled.

ASSESSING RADIATION DAMAGE

They are a bit like Laurel and Hardy with their one-liners, but Gordon Livingston and Mark Jenkins are friends who share a much more serious goal: determining how radiation affects cellular structure.

In a July presentation to high school teachers participating in the Tennessee Mathematics and Science Partnership (see “Formula for Excellence”), radiobiologist Livingston spoke matter-of-factly about the research. The director of the Cytogenetic Biodosimetry Laboratory has 25 years in the field of clinical and radiation cytogenetics, working with the victims of Chernobyl, radiation workers, and medical patients.

The Cytogenetic Biodosimetry Laboratory is managed by the Oak Ridge Institute for Science and Education and the Radiation Emergency Assistance Center and Training Site (REAC/TS).

Jenkins, director of REAC/TS, whose background is in health physics and industrial hygiene, delivered his talk on radiation—“energy that is released from a source”—with a clicking Geiger counter.

Together the two men run one of two federally funded laboratories that can measure the amount of exposure an individual has had to radiation during a radiation accident. The measurement is accomplished by examining the exposed individual’s lymphocytes for radiation-specific chromosomal aberrations

Assessment of the measure, which takes 48 hours, helps the medical community with the evaluation, triage, and management of individuals involved in a radiation accident when the exposed individual does not have a dosimetry device, the small buttons routinely

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FORMULA FOR EXCELLENCE

Backed by Tennessee’s world-class research resources, a new program helps the state’s teachers hone math and science skills and open career doors for their students.

ARTICLE BY: PAM STRICKLAND

As Tennessee competes to improve the quality of science and math education across the state, a new two-year program for high school teachers is helping them capitalize on the state’s scientific resources.

The Mathematics and Science Partnership, a project among the University of Tennessee (UT), Oak Ridge National Laboratory (ORNL), Middle Tennessee State University (MTSU), the University of Memphis, and the Oak Ridge Institute for Science and Education (ORISE), engages teachers from throughout the state.

The program started with a series of four-day workshops in Oak Ridge this past summer designed to expose teachers to current discoveries in the field of science and give them the tools to use that knowledge to educate their students.

During the initial workshop in July, teachers met with top scientists and educators from UT, ORNL, and ORISE. They toured some of the world’s most advanced laboratory facilities and learned about applications of technology not reflected in current textbooks.

For program participant Joy Wilson of Murfreesboro, Tennessee, ORNL had existed more as a historical site than a vibrant place where scientists and mathematicians continue to advance new discoveries that are changing our world.

“I knew the history of the lab’s atomic research, and that’s all that ever registered when I heard the name Oak Ridge,” says Wilson. “I had no idea about the cutting-edge science that’s going on there today.”

Her opinion changed in July when Wilson, who teaches advanced placement calculus, statistics, and physics at Rutherford County’s Blackman High School, joined 120 other Tennessee teachers who are participating in the program.

THE POWER OF INNOVATION

The program’s purpose is simple, says Sheila Webster, research program development director for the University of Tennessee’s Institute for a Secure and Sustainable Environment.

“These teachers are learning about the latest innovations taking place in the lab,” says Webster, who represents UT in the program. “Through this program, they will be able to integrate those scientific processes and discoveries into the math and science classes they teach.”

Teachers taking part in the program will be prepared to teach top-level science classes in their schools and bring innovative approaches to their classrooms. Webster says that, in addition to imparting advanced math and science skills, the program will help expose students to the new career opportunities in the research fields.

“It has been extremely valuable for teachers to see the work at Oak Ridge. It provides them with new perspective and energy to take back to the classroom,” says Dovie Kimmins, assistant director of the Math, Science, and Technology Education Center at MTSU. “Sheila Webster has done an excellent job of coordinating with the universities and Oak Ridge officials. It’s an



Tennessee science and math educators gather in Oak Ridge to hone teaching skills, open career doors for their students, and observe first hand some of the technological resources resident in the state.

excellent balance.”

Three teachers represented Rutherford County at the four-day session for Middle Tennessee teachers in July. Separate four-day sessions were also held for 40 East Tennessee teachers as well as 40 teachers from the western part of the state.

To encourage creative learning among her students, Wilson hopes to take them on a field trip to ORNL, where they can observe first hand the pursuit of high-level science.

The teachers who attended this summer’s workshops will spend two years in the program. During the 2007-08 academic year, they will meet once a month to build advanced content and pedagogy skills. Next summer, they will participate in an intensive summer institute, developing a deeper understanding of math and science. During the 2008-09 school year, teachers will devote monthly sessions to developing activities to integrate the materials into the classroom. As this initial group enters the second year, a new class of teachers will begin the

process. Recruitment for the second group is taking place in the fall.

This summer’s sessions explored nanotechnology, aquatic toxicity testing, genomics, and cytogenetics biosimetry (use of the human body’s response to radiation as the basis for accurately estimating exposure). There were also tours of key Oak Ridge scientific facilities, presentations on advanced placement courses, and instruction on using technology in the classroom.

“It’s stimulating for teachers to actually observe the world-renowned research that this lab conducts here in Tennessee,” Webster says.

She adds that the exposure helps teachers gain advanced knowledge in their fields of instruction, because much of the information is so new that “it’s not yet reflected in textbooks or the research literature.”

TENNESSEE NEEDS PROBLEM SOLVERS

That suits Scott Eddins just fine. As the

Tennessee Department of Education’s coordinator of secondary mathematics, Eddins wants to see students honing their creative problem solving rather than engaging extensively in rote work.

Speaking to the teachers, Eddins referenced Tennessee business roundtables, where private-sector leaders often “tell us that the important capabilities people need in the workplace are basic problem-solving and communication skills.”

For teachers to build those skills among their students, says Eddins, the curriculum must be presented in a relevant way. “Students need to learn process skills. They need to learn how things actually work.”

Eddins voices concern about jobs moving overseas and notes the clear connection between increased employment opportunities and improved math, science, and problem-solving skills.

“The jobs leaving this country are no longer our jobs,” he says. “We have two choices: learn to compete or lower our standard of living. Nobody wants to

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lower the standard of living, so we must focus on innovation and creativity” in preparing students for the workplace.

To that end, students need a “rigorous, relevant curriculum and sufficient resources,” Eddins continues.

Wilson contends that one of the problems is that creative thinking has been taken out of the classroom.

“Students are taught that they can’t color outside the lines. By the time they get to the second or third grade, they’ve learned to play a game called ‘what the teacher wants,’” says Wilson. Science, by contrast, requires innovation, rewards unconventional thinking, and often renders unexpected results.

SURMOUNTING BARRIERS

For Wanda Bell, who teaches biology at Grundy County High School in

Coalmont, Tennessee, resources are a large part of the problem. But it’s just not the resources in the classroom.


Some 70 percent of Grundy County High School’s nearly 700 students are classified as economically disadvantaged, which affects motivation and self-esteem.

Bell believes that exposing her students to real world applications of science and technology will help them understand that these skills are essential to a wide range of professions.

Bell was especially impressed with the presentation by cytogenetics biodosimetry scientists because each researcher had entered the profession from a different background. The fluidity of careers in science and the ability to pursue new opportunities—provided students are grounded in math and science—imparted an important lesson

for Bell. “You can start out being a forester or a computer scientist. Then one thing leads to another,” she says. “My kids need to hear that.”

Webster maintains that Tennessee possesses unique strength in the fields of science, math, and technology and should serve as a resource for the state’s teachers.

“We’re fortunate in Tennessee to have access to these amazing scientific resources,” said Webster, director of ISSE’s Technology Research and Development program. “They are a great tool as we look for our state to be more competitive in science and math education.” 

For More Information

Contact: Sheila Webster at 865-974-4251 or email: swebster@utk.edu.

ASSESSING RADIATION DAMAGE

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worn by healthcare and industrial radiation workers and researchers to measure radiation exposure.

Livingston says this area of research was discussed in the early days of the nuclear age. However, he says, it was dropped because so few accidents took place. Interest in the research was revived in the late 1990s because of the global increase in terrorism attacks. Funding was secured after the attacks of September 11, 2001.

A radiation accident is of concern because ionizing radiation can create genetic alterations in DNA. The amount and type of treatment needed to counteract such exposure can be determined only if the doctors know the level of exposure.

The process is extremely detailed but, overall, involves incubating lymphocytes from blood samples for 48 hours then harvesting the lymphocyte samples and placing them on glass slides in a weak salt solution. The chromosome images are magnified up to 1,000 times

so that the structure can be examined. Chromosomes are routinely connected in one place. The level of damage is determined by the frequency of dicentric—chromosomes connected two times—that are found in the lymphocytes. Damaged chromosomes can also be connected more than two times or not be connected at all.

In blind tests conducted over the last year at Oak Ridge and at the Armed Forces Radiobiology Research Institute in Bethesda, Maryland, the two labs had an error rate of less than 10 percent when determining the level of exposure the blood had received.

“There are a lot of delayed effects of radiation,” Livingston said. “But if the amount and type of exposure can be determined early on, in many cases there is a very good chance that treatment can be handled with antibiotics and fluids.”

—Pam Strickland

ISSE RESEARCHER TARGETS TROUBLESOME HAZARDOUS WASTES

A \$1.3-MILLION RESEARCH AWARD WILL LEAD TO COST-EFFECTIVE CLEANUP OF SOME OF THE MOST PERSISTENT AND TOXIC WASTES AT FEDERAL FACILITIES.

ARTICLE BY: DAVID BRILL
FOR MORE INFORMATION CONTACT: JACK PARKER, 865-974-7718, OR EMAIL JPARKER@UTK.EDU

Decades of weapons production and base operations have left the U.S. Department of Defense (DoD) with a legacy of as many as 3,000 sites contaminated with dense non-aqueous phase liquids (DNAPLs).

DNAPLs are among the more troublesome—and costly—toxic substances to remediate, and contamination may be linked to adverse human health effects, including birth defects and cancer.

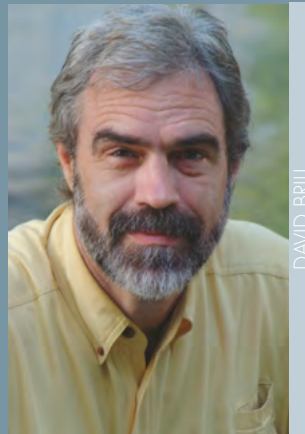
Jack Parker, a research professor with the University of Tennessee's (UT) Institute for a Secure and Sustainable Environment (ISSE) and Department of Civil and Environmental Engineering, and Peter Kitanidis of Stanford University's Department of Civil and Environmental Engineering have been awarded \$1.3 million, over three years, to develop methods for selecting and designing remediation and site-characterization plans that meet cleanup criteria while minimizing total costs.

Parker and Kitanidis received the award from DoD's Strategic Environmental Research and Development Program (SERDP). The methodology will be field-tested at Hill (Utah) and Dover (Delaware) U.S. Air Force Bases (AFB).

Aleisa Bloom, group leader of the DoD Base Technical Support Group at Oak Ridge National Laboratory, and Kyle Gorder, project manager with the Hill AFB Environmental Restoration Branch, will assist with the project.

Once the project is completed, the research group's cost-optimization methods can be applied at the nation's other DNAPL-contaminated sites, which include more than half of the sites identified by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, also known as Superfund.

According to the researchers, "the history of DNAPL site remediation over the last 30 years can best be described as the history of serial underestimation of cleanup costs." The project will pro-



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Jack Parker

duce comprehensive methods and computational tools for making cost-effective decisions on site characterization and remediation to meet DoD's specified cleanup goals.

"This project will focus specifically on optimal management of DNAPL-contaminated sites, which pose a major problem at many DoD facilities," says Way Kuo, dean of the UT

College of Engineering. "The ability to apply and evaluate these methods and computational tools at Hill and Dover AFBs will be of direct and immediate benefit. This study may also lead to conclusions applicable to other national policy issues, such as which approaches make most sense in the real world of complex and hard-to-characterize sites."

Costs for cleaning up these sites can easily run in tens of millions of dollars, with larger sites costing many times more, says Randall Gentry, ISSE director and associate professor in UT's Department of Civil and Environmental Engineering. "If Parker's methodology achieves even modest cost reductions, cumulative savings to the federal government can run into the billions of dollars," Gentry says.

Current remediation technologies for DNAPL contamination of soil and water include, among other approaches, in-situ chemical and thermal treatment, enhanced microbial degradation, extraction with surfactants, treatment of extracted groundwater, monitored natural attenuation, and use of various containment methods to limit further migration.

DNAPLs, chiefly chlorinated industrial solvents, saw widespread use beginning in the mid-20th century and continuing until the 1980s, when monitoring revealed significant contamination of groundwater.

Love Canal, a neighborhood of the city of Niagara Falls, New York, has become synonymous with DNAPL contamination. The 10-square-block residential area—home to nearly 1,000 families—surrounded an abandoned landfill used by a chemical company as a dumping ground for thousands of tons of various hazardous wastes, including polychlorinated biphenyls (PCBs) and other DNAPLs. The neighborhood ultimately was declared a Superfund site and evacuated.

BUILD IT GREEN

To assist consumers, building contractors, and purchasing agents in their decision making, the University of Tennessee's Center for Clean Products (CCP) has joined an international partnership to improve the selection process for sustainable construction and building materials. Announced in November 2006, Pharos is an evaluation tool that assesses building materials for their life-cycle environmental and human-health impacts. The tool further evaluates the social and economic impacts associated with raw material sourcing, manufacture, and delivery of construction materials.

Pharos product evaluations communicate key environmental indicators associated with a product's manufacture, such as use of renewable materials, embodied energy, or toxic content. Other categories rank corporate practices, occupational and consumer safety, stakeholder equality, and other socio-economic criteria, all of which, says CCP Director Jack Geibig, "will change how consumers think about materials."

For retail consumers, evaluations are printed on a label that's attached to finished products, similar to nutritional labels on foods. For purchasing agents and contractors, the Pharos evaluation is included along with marketing literature and product information. These data are also accessible from the searchable Pharos Web site.



The key graphic communication device is the "Pharos lens," which radiates sustainability scores around a segmented wheel. Red bars close to the center indicate poor product performance; green bars close to the outer edge indicate something approaching an ideal product for that category.

ENVIRONMENTALISM ENTERS *the* BOARDROOM

When it comes to the fight to protect the planet, this ISSE center insists on keeping it clean—and green.

ARTICLE BY: ERIC OGLE

As the litany of environmental woes facing the nation and globe grows in scale and complexity—much of it linked to hyper-consumerism and inefficient and wasteful production processes—the industrial community has begun to regard environmental stewardship a cornerstone of good business. And the University of Tennessee's (UT) Center for Clean Products (CCP), a subunit of UT's Institute for a Secure and Sustainable Environment, is poised to help the nation's corporations—and consumers—make the transition to environmentally preferable products and production processes.

CCP was established in 1992 in anticipation of the emerging national and global trend toward product stewardship, green materials, and green consumerism. The timing was propitious; CCP was present at the birth of a new industrial movement that has burgeoned in recent years.

Consider, for instance, that worldwide investments in clean technologies soared 51 percent in the first three quarters of 2006, to \$761 million, according to an analysis by Dow Jones VentureOne and Ernst & Young. The venture-capital firm Kleiner, Perkins, Caufield & Byers, which rose to fame by backing the likes of Google, Amazon, and Netscape, this year doubled its clean technology fund to \$200 million.

CONVERGENCE OF TECHNOLOGY AND POLICY

Since its founding, CCP's partnerships

have devised ways to redesign a wide range of products, including household and industrial cleaners, personal grooming products, product packaging, floor coverings, office furniture and supplies, electronics, automobiles, and modular homes.

Jack Geibig, an environmental and chemical engineer, directs CCP. Catherine Wilt, an environmental planner and political scientist, serves as policy director for the center. Together, along with the other CCP staff and students, Geibig and Wilt bring the skills necessary to develop clean products technologies and shape the policies that promote their adoption.

Under Geibig's technical leadership, CCP works with manufacturers to analyze their manufactured goods and inventory the raw materials along the supply chain for such criteria as recycled content, embodied energy, volatile organic compounds, and toxic content. From there, CCP researchers quantify the product's life-cycle impacts on indoor air quality, human health, and global climate change, among other criteria. Armed with detailed information about these products, the center can work with suppliers to improve their formulations, products, and production processes accordingly.

A recent product evaluation by the center helped the Evercare Company, a global leader in household cleaning and organizing products, remove much of the toxic chemical content from its product, unseat a current supplier to major retailer, and

land a five-million unit contract. Improvements in product design and manufacturing not only eliminated toxics; they also cut the company's per-unit production costs by 5 percent.

Wilt's efforts have resulted in agreements among stakeholders from major industrial sectors to voluntarily divert waste products from landfills. For instance, Wilt facilitated the Midwestern Workgroup on Carpet Recycling. The workgroup, which included both carpet industry and nonindustry representatives, endorsed a plan in which an independent, industry-funded organization will look for ways to recycle and reuse old carpet.

In another collaborative effort, Wilt helped facilitate the National Electronics Product Stewardship Initiative, which engaged government regulators, electronics producers, and other stakeholders in discussions to enhance collection, reuse, and recycling of electronics products in the United States.

"When an industry becomes part of the solution, that's good product stewardship," says Wilt, former president of the National Recycling Coalition. "By



DAVID BRILL

CCP Director Jack Geibig and Policy Director Catherine Wilt are helping corporations embrace sustainable production processes.

going through these decision-making processes with stakeholders, we are providing incentives for products to be manufactured and managed in an environmentally conscious way, creating a beneficial situation for consumers, government, and the industries themselves."

ENVIRONMENTAL CERTIFICATION

In an effort to help guide consumers' purchasing patterns, CCP has worked extensively with Green Seal. Founded in 1989, Green Seal provides science-based environmental certification standards that are credible, transparent, and essential in an increasingly educated and competitive marketplace. CCP researchers have led the development of several Green Seal standards, including the mar-

ket-dominant GS-37 standard for industrial and institutional cleanup and the newly developed standard for green cleaning services, GS-42.

Pharos, a new CCP partnership, will help guide the purchasing decisions of consumers, contractors, and architects involved in construction projects. (See "Build It Green.")

Another large-scale effort to move environmentally preferable building materials into the mainstream has joined CCP with regional partners to rebuild the hurricane-ravaged Gulf Coast. Funded by a three-year grant from the U.S. Environmental Protection Agency's (EPA) National Center for Environmental Research, CCP will partner with the Healthy Building Network, Unity Homes, and Clayton Homes on the project.

"The Gulf Coast presents a tremendous opportunity to mainstream the absorption of healthy building materials and systems in the housing industry," says Geibig. "This project has immediate impact on people in need and allows us to make significant

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TABULATING ENVIRONMENTAL BENEFITS

The University of Tennessee's Center for Clean Products, under a cooperative agreement with the U.S. Environmental Protection Agency, developed the Electronics Environmental Benefits Calculator, which was recently used by the Green Electronics Council as part of its Electronic Product Environmental Assessment Tool (EPEAT).

A report issued by the Green Electronics Council used the calculator to estimate savings of 26.8 million tons of materials by manufacturers building machines following EPEAT guidelines.

Additional calculated benefits of following EPEAT guidelines include a savings of 13.7 billion kilowatt hours of electricity, enough to power 1.2 million U.S. homes for a year; prevention of 61.7 million tons of air pollution, the equivalent of removing 852,000 cars from the road for a year; prevention of 130,000 tons of water pollution; reduction of toxic material use by 1,179 tons; and avoidance of disposal of 45,304 tons of hazardous waste. The full report is available online at <http://www.epeat.net/benefits.aspx>

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improvements in social and environmental sustainability requirements related to the housing industry.”

The project brings a commitment to community health and the environment that extends through all elements of design and materials selection for modular housing.

“The Gulf Coast presents a tremendous opportunity to mainstream the absorption of healthy building materials and systems in the housing industry.”

“Not only are the materials acquired from sustainable sources,” says Wilt, “the homeowner can expect lower maintenance and utility bills as well once the homes are completed.”

DISAPPEARING WASTE

Though many of CCP’s projects are national and even global in scope, Wilt insists on doing what she can to guide the East Tennessee community toward a more sustainable future. In 2005, Wilt helped found the Tennessee Valley Earth Partnership (TVEP) to promote environmental education and awareness initiatives in the region and currently serves as the organization’s president.

For the past six years, Wilt has served as co-organizer and chair of the steering committee for TVEP’s major annual event, EarthFest, one of the largest Earth Day celebrations in the Southeast.

EarthFest held its first “waste-free” event in 2006 at World’s Fair Park, welcoming 10,000 guests and 100 exhibitors but producing only 152 pounds of non-recyclable materials. The 2007 event, which drew 14,000 people, produced only 25 pounds of

nonrecycled or composted waste. The Tennessee Department of Environment and Conservation awarded TVEP a 2007 Governor’s Stewardship Award for Environmental Education and Outreach. (See “Partners in Clean.”) Wilt also accepted an award for Outstanding Community Leadership in Tennessee given by Keep Tennessee

Beautiful and the Tennessee Department of Transportation.

A NEW MARKETPLACE

According to Geibig, the business community faces increasing pressure to adopt sustainable principles and practices, both in their primary operations as well as throughout their supply chains. The pressure stems in part from ever-more-stringent government regulation as well as from green leaders in the private sector who are shaping a new business paradigm and inclining greener-minded consumers to demand products that are gentle on the environment.

In response, mass-market retailers and institutional suppliers are taking steps to feature greener products in their catalogs and on their shelves. Wal-Mart, for instance, has targeted 20 percent of its supply chain—168,000 suppliers strong—to offer products that are “environmentally preferable.”

CCP was on a short list of environmental research organizations invited to the Wal-Mart “Live Better” Sustainability Resource Fair, held in Rogers, Arkansas, in early October. There, Wilt and Geibig interacted with CEOs of some of Wal-Mart’s leading

suppliers, offering their services to companies eager to improve their environmental profiles but in need of guidance in making the transition.

Patrick Sbarra, president of New Creature ad agency, whose company makes point-of-purchase displays for Wal-Mart suppliers, said environmental sustainability is “on the tips of the tongues of every supplier to Wal-Mart right now.”

He’s probably right, considering that the federal government is helping to drive the market. EPA Executive Order 13101 requires federal acquisition of recycled, energy-efficient, bio-based, environmentally preferable products and services.

The federal government is the single largest institutional consumer of goods and services in the United States, spending more than \$200 billion annually.

With Wal-Mart and the federal government fueling demand for environmentally superior products and processes, Geibig and Wilt will have no trouble finding clients eager to clean up their acts. 

For More Information

Contact: Jack Geibig, 865-974-6513,
or email: jgeibig@utk.edu.

ISSE Staff Citings

ISSE IN THE MEDIA. ISSE Director **Randy Gentry** and **Tim Ezzell**, director of ISSE's Community Partnership Center, appear on segments of UT Chancellor Loren Crabtree's television show *Campus Conversations*. The 30-minute show airs on UT television station UTTV (campus cable channel 65; Comcast digital channel 194). **Gentry's** segment, recorded August 13, 2007, discusses ISSE's research agenda and sustainability science. **Ezzell's** segment, recorded on August 3, 2007, which also features Carroll Van West, director of the Center for Historic Preservation (CHP) at Middle Tennessee State University, explores preservation of UT historic structures and receipt of a Campus Heritage Grant from the J. Paul Getty Trust. You can view the sessions here: <http://chancellor.utk.edu/conversations/index.shtml>. **Gentry** also appeared in "East TN is No Stranger to Droughts," which aired on WBIR TV, the Knoxville NBC affiliate. The story is also posted on the station's Web site:

<http://www.wbir.com/news/local/story.aspx?storyid=50104>.

ISSE's programs and staff are highlighted in the fall 2007 edition of *Scientia*, UT's annual research magazine. "Fuel Sell" profiles **Jonathan Overly** and ISSE's East Tennessee Clean Fuels Coalition, and "The Federal Bang for the Public Buck" explores the efforts of ISSE Research Leader **Jean Peretz** and Environmental Sustainability Program Director **Bruce Tonn** (political science) to evaluate the cost effectiveness of the Department of Energy's Automotive Lightweighting Materials Program.

A May 17, 2007, *Popular Mechanics* article titled "Turbine Turbulence: How to Fix U.S. Wind Power" explores obstacles to wider adoption of wind power in the United States and proposes solutions to overcome them. In the article, **Mary English**, ISSE senior research leader, comments on the uncertainties of wind power: "We need predictability in energy, and to rely on wind energy is questionable, until you have a means of storing the energy." Access the article here:

<http://www.popularmechanics.com/science/earth/4216776.html?page=1>

Bruce Tschantz, ISSE senior research associate and professor emeritus (civil and environmental engineering), was quoted extensively in "Low-head Dams Dangerous, Unmarked by State," which appeared in the October 21, 2007, edition of the Fort Wayne (Indiana) *Journal Gazette*. The article details the dangers associated with low-head dams, which are often covered by water, difficult to see, and pose a drowning hazard for boaters and kayakers. Based on **Tschantz's** 2003-04 survey of 37 states, about 35 deaths over a 10-year period were associated with low-head dams, however

Tschantz's review of newspaper stories found about 100 deaths since 1970. **Tschantz** has presented his findings to the national conferences of the Association of State Dam Safety Officials and the National Association of State Boating Law Administrators.

Access the *Journal Gazette* article here: <http://www.journal-gazette.net/apps/pbcs.dll/article?AID=/20071021/LOCAL/710210319/1002/LOCAL>

Tim Ezzell was profiled in the 2007 edition of *Higher Ground*, the annual magazine of UT's College of Arts and Sciences. "Man with a Plan" discusses the efforts of ISSE's Community Partnership Center to provide university resources to low- and moderate-income communities in East Tennessee and **Ezzell's** receipt of Campus Heritage Program Grant from the J. Paul Getty Foundation.

SENATE TESTIMONY. **William Fulkerson**, ISSE senior fellow, presented testimony before a hearing of the U.S. Senate Energy and Natural Resources Committee in May. **Fulkerson** spoke about coal and biomass gasification, diesel synfuels production, co-production of electricity, and topics related to oil security and climate change. Closing his testimony, he presented a set of policies that could encourage innovation in developing solutions to the coupled problems of oil security and climate-change mitigation. Since retiring from Oak Ridge National Laboratory in 1994, **Fulkerson** has chaired the Laboratory Energy R&D Working Group, which includes representatives from 14 U.S. Department of Energy national laboratories.

PRESENTATIONS. **Kimberly L. Davis**, ISSE director of Programs and Outreach, and Robert Emmett Jones (sociology) presented results of their 2006 survey of Knox County homeowners to a special workshop for Knoxville/Knox County Metropolitan Commission (MPC), Knoxville City Council, and Knox County Commission. The presentation focused on attitudes and knowledge about protection and maintenance of the local urban forest. The workshop provided an overview of process and concepts associated with the proposed "Knoxville/Knox County Tree Conservation and Planting Plan," which was approved unanimously by the Board of Commissioners in June.

Larry McKay, leader of ISSE's Water Resources Program and UT professor (earth and planetary sciences), will spend the next year traveling as the Geological Society of America's (GSA) Birdsall-Dreiss Distinguished Lecturer for 2008. As the Birdsall-Dreiss lecturer, **McKay** will give invited lectures at universities around the world on (continued on page 16)

ISSE CO-SPONSORS CONFERENCE ON ENERGY AND ETHICS

ENERGY & RESPONSIBILITY: A CONFERENCE ON ETHICS AND THE ENVIRONMENT WILL CONVELE AT THE UNIVERSITY OF TENNESSEE APRIL 10-12, 2008.

FOR MORE INFORMATION: MARY ENGLISH, 865-974-3825, OR EMAIL MENGLISH@UTK.EDU.

Conflicts and controversies about energy have become familiar features of the political and economic landscape around the globe. The environmental consequences of energy production, distribution and consumption, and energy policy invite consideration of the ethical implications of both practice and policy.

“Energy & Responsibility: A Conference on Ethics and the Environment” will explore society’s ethical obligations to manage the Earth’s resources and natural environment in a sustainable manner. Conference sessions will also examine how these obligations should be enacted, institutionalized, and implemented.

Among the confirmed keynote speakers is R. K. Pachauri, chairman of the Intergovernmental Panel on Climate Change (IPCC). The IPCC is the co-recipient, along with Al Gore, of the 2007 Nobel Peace Prize. Other confirmed speakers include Henry Shue, Merton College, Oxford; Robert H. Socolow, Princeton University; Dale Jamieson, New York University; Richard Morgenstern, Resources for the Future; and Dale Bryk,

(continued on page 13)

NATURAL GAS

In September, 20 researchers and national program leaders from China joined UT and other U.S. colleagues in exploring ways to increase global biofuels production while reducing the fuels’ environmental impacts.

ARTICLE BY: DAVID BRILL

Despite vastly different political structures and geographic regions, China and the United States face common challenges in meeting growing energy demand while reducing harm to the natural environment.

This fall, a Chinese delegation of 20 senior researchers and program leaders from the Chinese Academy of Sciences (CAS) and the Chinese Ministry of Science and Technology visited the University of Tennessee (UT) to participate in a workshop focused on the “environmental aspects of bioenergy production and sustainability.”

The workshop built on an initiative launched in July of 2006, through which scientists from UT and Oak Ridge National Laboratory (ORNL) joined CAS researchers in establishing the China-U.S. Joint Research Center for Ecosystem and Environmental Change.

U.S. participants in the initiative include the UT/ORNL Joint Institute for Biological Sciences (JIBS), UT’s Center for Environmental Biotechnology, and UT’s Institute for a Secure and Sustainable Environment (ISSE). ISSE co-sponsored the September workshop with JIBS.

Participating CAS units include the Institute of Geographical Science and Natural Resources Research and the Research Center for Eco-Environmental Science.

The China-UT center occupies research facilities at both UT/ORNL and CAS.

“The fast-growing bioenergy industry offers extraordinary opportunities for securing world energy, improving envi-

ronmental protection, and mitigating climatic change,” says Gary Saylor, JIBS director and UT distinguished professor of microbiology, ecology, and evolutionary biology.

Bioenergy production uses rapidly renewable materials, like woody crops, and biowastes as fuel instead of coal, petroleum, and natural gas, which take thousands of years to regenerate.

“But biofuel production—particularly production of liquid biofuels like cellulosic ethanol—poses some significant challenges,” says ISSE Director Randall Gentry. “Substantial demands on land and water resources threaten food security and the biodiversity of ecosystems. The replacement of primary forests and virgin grasslands with energy crops may result in large releases of carbon from soils and forest biomass.”

These releases, says Gentry, “could potentially negate biofuels’ environmental benefits at the point of combustion.”

Through the three-day workshop, scientists explored both the promise and potential liabilities associated with biofuels production, addressing improved processes for converting lignocellulose to ethanol, genomic tailoring of plants and microbes for bioenergy production, landscape design for bioenergy feedstocks, carbon-sequestration, and rural economic development associated with bioenergy.

Presenters represented the participating organizations of the China-UT Joint Research Center for Ecosystem and Environmental Change as well as the National Science Foundation, U.S.



ISSE WELCOMES NEW STAFF MEMBERS

Jack Parker has joined the ISSE staff as a research professor. He holds the same position in the University of Tennessee's (UT) Department of Civil and Environmental Engineering. Prior to joining UT, Parker served for six years as a Distinguished Research Scientist at Oak Ridge National Laboratory.

ISSE Research Professor **Jie (Joe) Zhuang** also serves as a research assistant professor in the Department of Earth and Planetary Sciences and coordinates the China-U.S. Joint Research Center for Ecosystem and Environmental Change. Over the past 20 years, Zhuang has worked on numerous scientific projects in China, Japan, and the United States.

Jennifer Bradley, a master's student in architecture; **David Crockett**, a master's student in planning; **Amanda McKenna**, a master's student in environmental engineering; and **Joan Monaco**, a senior in a five-year architecture program, have joined the staff of ISSE's Center for Clean Products.

Shesh Koirala, who is pursuing his Ph.D. in civil and environmental engineering, is working with ISSE Director Randall Gentry.

Nai Ratchukool, who is pursuing her Ph.D. in instructional technology, is working on the National Biological Information Infrastructure/Southern Appalachian Information Node project.

Emily Roberts, an undergraduate student in environmental studies and biology, is working with ISSE's Technology Research and Development Program.

Two AmeriCorps members have joined the staff of ISSE's East Tennessee Clean Fuels Coalition. **Tasha Boeckmann** received her bachelor's degree from Xavier University, and **Jill Gilbert** received her bachelor's degree from Hendrix College.



DAVID BRILL

Researchers from the Chinese Academy of Sciences enjoy a pre-workshop hike to Abrams Falls in Great Smoky Mountains National Park. ISSE Research Professor Jie (Joe) Zhuang (in foreground wearing glasses) helped organize the three-day workshop, which explored the environmental aspects of bioenergy production.

Department of Energy, Purdue University's Center for the Environment, and the H. John Heinz III Center for Science, Economics, and the Environment.

In fall 2008, the Chinese delegation will host a reciprocal workshop in Beijing. Proceedings from the

September 2007 workshop will be published by early next year, and PowerPoint presentations will be posted on the ISSE Web site. 

For More Information

Contact: Jie (Joe) Zhuang, 865-974-1325, or email: jzhuang@utk.edu.

CONFERENCE (CONTINUED FROM PG. 12)

Natural Resources Defense Council and Yale University

The conference, co-sponsored by the University of Tennessee's Institute for a Secure and Sustainable Environment, invites ethicists, legal theorists, energy policymak-

ers, energy enterprises, and environmental activists to engage in a conversation about ethics and responsibility on the contested terrain of energy and the environment.

Visit the conference Web site here: http://isse.utk.edu/energy_and_responsibility/.

INSTITUTE FOR A SECURE AND SUSTAINABLE ENVIRONMENT Director..... Dr. Randall Gentry

ISSE Program Leaders:

Agriculture and Natural ResourcesDr. Forbes Walker
Education and Social Perspectives.....Dr. Mary Rogge
Energy and Environmental Policy Research.....Dr. Christian Vossler
Environmental Security....Dr. John Sanseverino

Environmental Sustainability.....Dr. Bruce Tonn
Water Resources.....Dr. Larry McKay
Editor.....David Brill
Writers.....David Brill
Kris Christen
Dr. Randy Gentry
Eric Ogle
Pam Strickland

GROWING PAINS

As communities struggle with the impacts of sprawl, momentum is growing for changing the haphazard path development often follows.

ARTICLE BY: KRIS CHRISTEN

New subdivisions and commercial developments are sprouting up across the landscape, together with new roadways to feed them. Congestion, longer commutes, and dirtier air often follow in the wake. As this steady march of urbanization changes the character of the surrounding landscape, people are finding the resulting changes aren't always for the better.

East Tennessee is a prime example. The natural beauty of forests, mountains, and rivers abounds. Yet, as one drives along valley roads, more and more houses are dotting the hills on both sides, sometimes extending even to the ridgelines. Meanwhile, large forested tracts are becoming more and more fragmented.

Coming to terms with the challenges of rampant growth shaped the agenda for a conference—Plain Talk on Quality Growth—convened in Knoxville in March. Co-sponsored by the University of Tennessee's Institute for a Secure and Sustainable Environment (ISSE), the meeting brought together elected officials, planners, community decision makers, business and institutional leaders, and interested citizens for a frank discussion about how the region might grow and prosper while still sustaining the unique quality of life East Tennessee offers.

Overall participation far exceeded anyone's expectations, indicating a possible tipping point toward moving away from business as usual, says Wolf

Naegeli, a recently retired senior research scientist at ISSE and one of the conference organizers. With nearly 700 registrations, "we attracted a number of people who had never participated in these types of discussions before," he says. Moreover, many of those who attended hold positions of influence within local governments, a key condition for change.

Featured speakers included several high-level officials—among them U.S. Secretary of Transportation Mary Peters, Tennessee Department of Transportation Commissioner Gerald Nicely, and U.S. Congressman John Duncan (R-Tenn.). A score of other speakers and panelists brought lessons learned from experiences in addressing development issues in communities across the country.

"We wanted to share these outside experiences and models and get people together, so they could at least talk to each other and network," says John Lamb, planning director for nearby Blount County and conference co-chair. In evaluating better ways to address increasing growth pressures, says Lamb, "we'll need to identify our own set of standards for quality growth in East Tennessee."

SOBERING STATISTICS

Reflecting a national trend, the population in the 16 counties that make up the East Tennessee region grew faster during the early 1990s than at any time in

their history, according to recent census data. In 2006, the area topped 1.12 million people, nearly double the number who lived here in 1950. Population projections indicate continued regional growth into the future, adding roughly 12,000 to 16,000 people per year.

As the infrastructure to support these additional people has sprawled outwards from city centers, traffic has increased even faster than the population. Vehicle miles traveled is now outpacing population growth by a factor of four, according to statistics presented at the meeting. The resultant pollution has helped to cinch East Tennessee's spot near the top for some of the worst air quality in the country. In 2004, the U.S. Environmental Protection Agency declared multiple counties in the region in non-compliance with federal clean air regulations for ozone and fine particulate matter.

Another eye opener is how much development ultimately costs taxpayers. Usually communities try to attract development to expand the tax base, noted Daniel Williams in his keynote address. Williams, a Seattle-based architect, urban planner, and nationally recognized expert in sustainable architecture and planning, is author of *Sustainable Design: Ecology, Architecture, and Planning* (Wiley, 2007).

A recent study in Washington state found, however, that when all the costs associated with building new infrastructure—such as roads; water, sewer, and power lines; additional schools and libraries; stormwater controls; and so on—are accounted for, each new house costs taxpayers \$83,000, with very little paid by the development itself. So, in effect, "people who live in existing cities are subsidizing sprawl," Williams says. Moreover, that development is eating

up farmland and green space at a faster rate than population growth, and “what you end up with,” he points out, “is tremendous growth over land for a relatively small number of people.”

As a result, communities nationwide are now calling for change and challenging local officials to chart a more sustainable direction. “We can make a difference in deciding how we want to develop and how we want to live,” Williams says. And “if we don’t make these decisions,” he warns, “we’re probably not going to like what we end up with.”

AT A CROSSROADS

Mistakes have been made; the question now is how to reverse them, says William Lyons, Knoxville’s senior director for policy development. Lyons led a pre-conference discussion on smart growth. “We still have a lot of open space and land, and we have to figure out carefully how we’re going to use it,” preserving the ecological services that nature provides and keeping East Tennessee’s character intact.

Key to that equation is public involvement in planning, managing, and regulating land use and development, Williams says. Likewise, decisions made must ensure that every new building design connects regional economic, social, and environmental values.

Other panel sessions explored what that might look like for this region, and one theme recurred through most of them: zoning ordinances. As things stand now, zoning often segregates our work and living spaces, participants noted. Consequently, we have to drive everywhere, even for a loaf of bread at the grocery store. As traffic congestion

worsens, these trips take longer and longer. In turn, our efficiency decreases, and quality of life starts to degrade. The panelists’ comments suggest that boosting prosperity requires creating more livable, walkable communities with an abundance of parks, green spaces, bicycle paths, greenways, and better public transport. Short-term fixes include building pedestrian linkages between individual subdivisions that currently end in cul-de-sacs. Over the long-term, panelists contend, we need to bring our land uses back together, paying for public infrastructure only where we want growth to happen and letting developers bear the costs elsewhere.



PLAIN TALK *on* QUALITY GROWTH

AN EAST TENNESSEE CONFERENCE


Some so-called smart-growth or new-urbanism design concepts are taking root in pockets around the region, but historically there haven’t been a lot of good examples, says Joe Hultquist, a Knoxville city councilman and conference co-chair. The Knoxville South Waterfront development, an urban renewal project, is one such example. Built on an old industrial site close to the downtown area, the compact village features a continuous riverwalk along the shoreline; several parks; improved streets, sidewalks, bikeways, and parking; and private development that will add new housing units, retail and office space, and entertainment opportunities. This showcase project “is an important model of what we want to be,” Lyons says, and is expected to increase both the density and predictability of development over the next 20 years.

NEXT STEPS

Meeting participants identified a number of regional priority issues ranging from environmental protection and long-term sustainability to economic and business development to the impact of special interests in planning processes. A steering committee is now being formed to analyze the feedback and information gleaned from the regional dialogues and to take this process to the next stage—namely determining what’s realistic and doable, Lamb says.

“Politicians certainly saw a level of support for doing things differently than they’ve ever seen before,” says Robb Turner a group leader at Oak Ridge Associated Universities responsible for analyzing issues related to conservation, ecosystem management,

energy needs, and sustainable development. “The meeting helped people to see across organizational boundaries and hear good ideas about what people are doing in other places,” Turner says. “Whether they can then take any of those and put them to work is really what it’s going to come down to.”

There are signs, however, that the tide is turning in this direction. Much “of this is converging,” due to a “sense of crisis that, perhaps, is making more of this possible that didn’t seem possible a couple of years ago,” Lyons says. 

For More Information

Contact: Wolf Naegeli, 4425 Balraj Lane, Knoxville, TN 37921-2938. Call 865-584-4806, or email: wnn@utk.edu.

ISSE Staff Citings

(continued from page 11) his research. Funding for McKay's travel comes both from GSA and from various offices within UT. Access a press release on McKay's appointment here: <http://www.utk.edu/news/article.php?id=4231>

Jonathan Overly made a presentation at the Solid Waste Association of North America's Quad State (Virginia, North Carolina, South Carolina, and Tennessee) Conference in August. "Regional Biodiesel Update: Users in Tennessee and North Carolina" provided an overview of the rapid growth of this alternative fuel in two southeastern states.

PUBLICATIONS. Senior Research Scientist John Peine wrote the chapter "Social Considerations of Species Conservation," which appears in *Conservation of Rare and Little Known Species: Biological, Social and Economic Considerations*, edited by M. Raphael and R. Molina and published by

Island Press. Peine also co-authored two additional chapters for the book, "Conservation Goals and Objectives" and "A Process for Selection and Implementation of Conservation Approaches."

Bruce Tonn and Jean Peretz published "State-Level Benefits of Energy Efficiency" in *Energy Policy* 35, 2007, pp. 3665-3674.

Environmental Justice in Transportation Planning and Projects: A Desk Guide for Tennessee was prepared by Mary English, with Fred Wegmann (civil engineering), Jerry Everett (Center for Transportation Research), and Shih-Lung Shaw and Yibin Zhao, (geography), as part of a project conducted for the Tennessee Department of Transportation. The other major part of the project is a GIS-based demographic screening tool developed by Shaw and Zhao.

Randall Gentry, Alice Layton (Center for Environmental Biotechnology [CEB]), Larry McKay, John McCarthy (CEB), Dan E. Williams (CEB), Shesh R. Koirala (civil and environmental engineering), and Gary S. Saylor (Joint Institute for Biological

Sciences) published "Efficacy of Bacteroides for Reducing the Statistical Uncertainty Associated with Hydrologic Flow and Fecal Loads in a Mixed Use Watershed" in *Journal of Environmental Quality*, V36, n5, (in press).

The Resource Team in a Context Sensitive Solutions Process, by Mary English, is a "lessons learned" report based on her observations of two context-sensitive-solution processes conducted for the Tennessee Department of Transportation.

David Brill, ISSE's communications director, published "Beast of Eden" in the fall 2007 edition of the *Tennessee Alumnus*. The article profiles UT alumnus Luke Dollar, whose efforts to save the endangered fossa of Madagascar led to his selection as a 2007 National Geographic Society Emerging Scholar. This fall, Brill also published "Cumberland Jack, K-9 King of Mt. Le Conte" in the inaugural edition of *Smokies Life*, a biannual magazine published by the Great Smoky Mountains Association.

NEWS FROM UT'S INSTITUTE FOR A SECURE AND SUSTAINABLE ENVIRONMENT

ISSE indicator
The University of Tennessee
311 Conference Center Building
Knoxville, Tennessee 37996-4134
isse.utk.edu
865.974.4251

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