Hellbender Press

East Tennessee's Environmental Journal

hellbenderpress.org

The Hellbender is a native salamander considered to be an indicator species. It is more sensitive to pollutants than other species; therefore, it indicates a problem exists before other species are affected.

FREE!

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Hellbender Press
East Tennessee's Environmental Journal
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Thomas Fraser, Mike Knapp, Rick Vaughan

Editor & Publisher
Amanda Womac

Assistant Editors
Stephanie Turner and Joel Smithson

Contributing Writers
Rob Baldus, Julio Custode, Stephanie Droste-Packham, Eric Gedenk, Jim Hagerman, Kathy Johnson, Ian Hedges Lycke, Chris Martin, Morgan McCorkle, Katie Murrah, Scott Noethen, Jordon Norton, Dean Hill Rivkin, Kindle Rouse, Tameka Tift, Stephanie Turner, Amanda Womac, Ray Zimmerman

Design and Layout
Susan Bauer Lee, Amanda Womac

Webmaster
Amanda Womac

Graphic Artist
Chad Hatala

Photographers
Roxanna Shohadaee and Matt Willings

Advertising
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GOOD FOR YOUR WORLD

Hellbender Press is a non-profit project of the FOUNDATION FOR GLOBAL SUSTAINABILITY, a multi-disciplinary advocacy and activist organization which monitors and addresses social and environmental issues in the Upper Tennessee Valley and Southern Appalachian Mountains. For more information about FGS, call (865) 524-4771, or e-mail editor@hellbenderpress.com or fgs@getsustainablenow.org. Donations to *Hellbender Press* are greatly appreciated, and are tax-deductible when made in care of FGS, P.O. Box 1101, Knoxville, TN 37901. FGS is a member of Community Shares.To volunteer your services, make a comment, report an error or suggest a story idea, call Amanda Womac at (865) 496.2964 or e-mail Amanda@hellbenderpress.com.

COMMUNITY SHARES

Nature's Bookshelf

Ray Zimmerman

Reincarnation

An old black vulture landed in a tree
overlooking Chickamauga Creek;
gave me a sidelong glance.

I thought of Edward Abbey,
critic of government agencies,
professor, and park ranger.

Abbey is buried in an illegal grave;
a cairn of stones to cover
his remains.

His friends saw to his request,
wrote on one stone,
"Edward Abbey, no comment."

The nemesis of Glen Canyon Dam
didn't want a memorial,
got one anyway.

He always said he'd come back
as a vulture next time,
just seemed fitting.

I looked up into the oak,
said "Hey there Ed,
looks like a good day for flying."

Abbey didn't say a word
just gave me that sidelong glance,
the old buzzard.

Glen Falls Trail

I climb the limestone stairs
through an opening in the rock,
into the earth's own womb,
pass through to a surprise:

"George loves Lisa," painted on a rock.
I wonder, did he ever tell her?
Did she ever know or think of him at all?
Raise a brood of screaming children?
Did they kiss near wild ginger above the rocky apse?
Did lady's slipper orchids adorn their meeting place
where deer drink from rocky cisterns?
Did their love wither
like maidenhair fern
as delicate as English Lace?

The symbols have outlived the moment.
There is only today and only me
hearing water running underground,
finding one trickle into a pool.
I never knew this George or Lisa.
The rock bears their names in silence.
The stream has forgotten them.

Cranes

Their voices
call to my ears
and call my eyes skyward.
Heard before they are seen,
they are cranes.

Cranes overhead
are flying off southward,
calling my thoughts to fly with them
to Okefenokee
or the Gulf coast of Florida.

The cranes are moving,
telling me winter is here.
Their call compared to bugling,
as has the wild elk's
and also to the barking call of geese.

But these are no geese.
Their call is no honk,
no barnyard bark for them.
Their call is a rattling "coo"
like doves amplified 1000 times.

Biographical Sketch

Ray Zimmerman was the subject of a feature article in the September, 2008 issue of Blush magazine. His chap book Searching for Cranes received a favorable mention from Contributing Editor Jeff Biggers in the November – December issue of Bloomsbury Review. He is a former president of the Chattanooga Writers Guild and won Second Place in the 2007 poetry contest of the Tennessee Writers Alliance. He read his winning poem, "Glen Falls Trail" at the awards ceremony of the Southern Festival of Books at Legislative Plaza, Nashville, Tennessee, ten days after undergoing coronary bypass surgery. He has organized poetry readings at Pasha Coffee House other Chattanooga venues. Zimmerman edits the Chattanooga Chat, newsletter of the Tennessee Ornithological Society, Chattanooga Chapter.

"Reincarnation" was previously published in the Earth First! Journal under the pen name "Mockingbird."

"Glen Falls Trail" won second place in the Tennessee Writers Alliance 2007 poetry contest. Ray read the poem at their awards ceremony at Legislative Plaza, Nashville, Tennessee at the Southern Festival of Books (This reading was ten days after he underwent coronary bypass surgery in Chattanooga.). "Glen Falls Trail" was published by the online literary magazine, www.vinestreetpress.com

"Cranes" was first published in the Chattanooga Chat, newsletter of the Chattanooga Chapter of the Tennessee Ornithological Society.

From the Editor's Desk

The Foundation for Global Sustainability seeks to educate and organize citizens to protect and preserve the natural environment and the quality of life in this region for the benefit of the general public. In order to do this, FGS informs the public about actions and practices that endanger the long-term health of the region, and thus endanger the opportunities of future generations. FGS actively interacts with other environmental groups to share information and facilitate research. FGS has served as an incubator for several prominent regional environmental organizations.

Almost 18 months ago, the May 2008 issue of *Hellbender Press* hit the streets. Editors set on celebrating the 10th anniversary of *Hellbender Press* decided to give the paper a facelift. Like most volunteer-run projects, unfortunately, the redesign fell by the wayside. We worked for months trying to find the resources needed for such an undertaking. And, as most other newspapers across the country discovered, the resources were just not easy to come by.

However, a new day has come and *Hellbender Press* is once again on the streets of Knoxville, celebrating the 10th anniversary of its publication just in the nick of time.

And what a time to return to the presses! The U.N. climate summit in Copenhagen offers ample opportunity for environmental journalists here in Knoxville to cover the effects of the summit at a local level. What opportunities will our local community seize in order to make this city a healthier and more sustainable place to live? From Bonnaroo to the Rossini Festival, *Hellbender Press* will print stories of greening efforts across the South.

But wait, some may wonder, newspapers across the country have closed their doors for the final time far too often over the past 18 months. How does a volunteer staff at *Hellbender Press* intend to survive?

One word: community.

A nonprofit newspaper can only be as strong as its community. *Hellbender Press* is not owned by a news corporation or even a local businessperson. This paper is a publication of the Foundation for Global Sustainability (FGS), a local nonprofit organization. In 1998, FGS established the Green Media Project with the aim of empowering environmental and other social change groups by providing quality information on issues not adequately addressed by the mainstream media. The following year, *Hellbender Press* was published, and the rest, as they say, is history!

Over the years, *Hellbender Press* has prided itself on having many contributing writers from the community. From lawyers and professors to bartenders and students, editors of *Hellbender* have welcomed environmental commentary and news features from the community.

Since its last publication, *Hellbender Press* has gained quite a group of volunteers from the UT journalism school, mostly thanks to Dr. Mark Littmann, chair of the science writing program. I remembering sitting in his class during my graduate program and listening to former editor Rikki Hall share his thoughts on journalism and encourage students to submit work to *Hellbender Press*. It was not too long afterwards, that I became a contributing writer and then assistant editor of the paper.

This issue features many students from UT who have been integral in helping get this issue to print. Their enthusiasm and dedication to environmental journalism is inspiring. Other community members have contributed to this issue; many of them returning columnists who add a uniquely-Knoxville voice to their commentary.

There are many surprises in store for *Hellbender* readers in 2010 as well. A new Web site, featuring breaking environmental news stories, video, blogs from our columnists and more, is underway and should be live mid-January at www.HellbenderPress.org. We'll also be seen tweeting via Twitter and posting announcements on Facebook, so keep your eyes peeled.

Thank you to all those who have supported *Hellbender Press* over the years. I welcome your feedback on the new layout and direction of the paper. Please email letters to the editor to Amanda@hellbenderpress.com with the words 'letter to the editor' in the subject.

Hellbender Press would not be possible without the support of our local community. If you are a small business owner committed to sustainable practices on a local level, *Hellbender Press* is a great place to advertise. Volunteers are always needed to get the papers on the street, so if you want to sling some 'benders, contact us!

I hope you enjoy this issue. I look forward to bringing you another one in spring and until then, get the latest from *Hellbender Press* at www.HellbenderPress.org.

KUB cuts "top" city council meeting

Eric Gedenk

Tuesday, Nov. 1, the Knoxville city council attempted to address concerns over Knoxville Utility's Board "vegetation management," a frequently revisited issue that involves KUB's program to control plant overgrowth near power lines.

For several years, local citizens and the utility provider have sparred over excessive tree trimming. Tuesday, councilman Rob Frost introduced a resolution in the Knoxville tree ordinance to institute an appeals board that citizens can contact when a tree is in question, as well as requiring KUB to contact homeowners before beginning cutting operations.

The board will be composed of one KUB official, two community members, an arborist and a representative from either the city park office or the parks and services department.

"If you have an issue, you have people who will listen to you," Frost said, noting that he has been contacted by many people over the past several years who felt that their venerable trees had been improperly cut.

The bill offers cautious hope for citizens who believe KUB has taken too many liberties in how they maintain environmental standards and treat ratepayer's property.

Local attorney Larry Silverstein has lived at his home on Sheffield Drive in West Knoxville for nearly fifty years. Three years ago, Larry witnessed his long-time neighbors' old maple tree cut literally in half by a practice called "ground-to-sky" cutting. Silverstein began fighting KUB and communicating with homeowners who lamented that not only was their property being abused, but Knoxville's essential canopy was being threatened.

Photo by Matthew Willings

Mr. Silverstein watched his neighbor's tree get cut in 2006, and has been fighting KUB on tree topping ever since.

Silverstein has since led a community effort to hold KUB more responsible for how much they are trimming. Cooperation from the utility company has been hard to come by.

Throughout the past three years, Silverstein has notified KUB numerous times regarding improperly-pruned trees and has received only an occasional response. In protest, Silverstein has helped found an impromptu campaign called "The Committee to Save Knoxville's Trees." Those interested in joining the mailing list can contact knoxtrees@aol.com.

KUB follows tree-trimming practices outlined by the International Society of Arborculture guidebook, especially printed for utility trimming companies as a reference. The book offers strategies for situational cutting, listing recommended courses of action depending upon the proximity of the tree to the power source.

Driving through the West Hills neighborhood, which has been one of the most vocal communities fighting this practice, one can see countless rounded, or "topped" trees, a practice the guidebook itself even discredits. Many argue that the escalation of the problem is due to KUB's lack of communication.

"KUB needs to communicate with ratepayers and be sensitive to how they are cutting trees," Frost said, adding the community's trees are "important on many different levels."

Kim Davis, chair of the Knoxville Tree Board, is also hopeful that KUB will improve communication with their customers and maintain higher standards when it comes to pruning.

"Sometimes these problems are from a lack of awareness on the homeowner's part about KUB's policies for tree trimming, and then they are taken by surprise when they come home from work and find their big trees forever altered."

Davis stated that funding issues surrounding effective replanting operations are one of the main obstacles relating to the city's canopy loss. Davis cites a three-fold solution: planting new trees, maintaining recently planted trees and cataloging tree resources for planning replanting.

Photo by Matthew Willings

Disfiguartion of mature trees, such as these willows at the intersection of Deane Hill Drive and Morrell Road has Knoxville citizens growing increasingly concerned about KUB's cutting practices.

American Forests, a non-profit citizen organization, found that managing existing canopy is environmentally and economically better for a city than extensive replanting programs.

Davis felt that the resolution was a message to KUB that, "Knoxville citizens are becoming even more vigilant about potential improper oversight of tree trimming contractors that they employ for vegetative management."

The resolution passed 8-1, but Silverstein is not convinced that adequate standards will have been met.

"I don't know what to expect," Silverstein said, encouraging any homeowner who is not notified by KUB before they begin cutting trees on their property to contact the utility provider and make themselves heard.

Silverstein obtained a copy of a 2005-2006 KUB document detailing the causes for cutting trees

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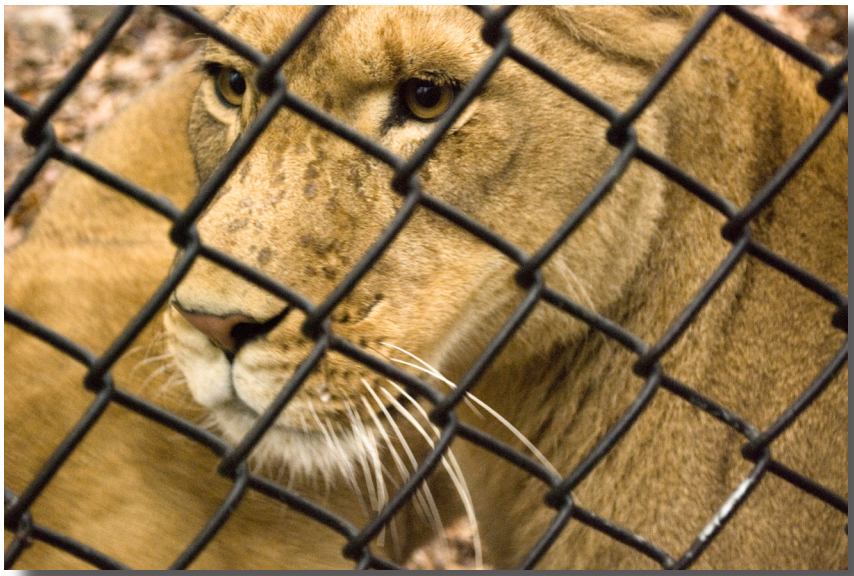
Through the Lens

"Through the Lens" is a new section of *Hellbender Press* dedicated to showcasing local phorography. The pictures included here are from the Knoxville Zoo. Photographer is Roxanna Shohadaee.



Treetops

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down. Out of over 6,500 trees cut by KUB, 1,560 were reported as "unknown," and 740 were classified as "trees out of trim zone."

Silverstein is not an easily-ignored voice for members of the community who think KUB's standards are unacceptable for the city of Knoxville.

Councilman Frost hopes that KUB can team up with the community in the coming months and finally develop a compromise "We can come out with a better process."

Hellbender Press will be following up on the resolution's progress in the Spring issue and updates will be available at *Hellbender Press* website, HellbenderPress.org, at the beginning of the year.

Gedenk is a junior at The University of Tennessee, majoring in Journalism with a concentration in science writing. He can be reached at edgedenk@gmail.com

Petascales

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used in other areas of research. Plans for additional lignocellulose simulations are scheduled for 2010.

"We're only at the beginning of our work now," says Petridis. "It's an ongoing cycle. We're still years off from practical use of bio-ethanol…we can expect a lot of improvement to come in the next three years."

Wade resides in Knoxville.

Yarnell

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thing, "Can't we do something else? Can't we do something real?" Then you all told me that you'd spent most of the year watching "relationship videos." You claimed that you'd all seen that particular one three or four times already.

I don't know what the truth was. I don't give the name of Our Old High School even though I don't think you were lying. The looks on your faces convinced me you'd all been lifelong victims of bureaucratic abuse and neglect. But I don't know what rules and pressures the teacher and the school were under from the county, state and federal officials. I don't know, for instance, that officialdom had deemed it necessary to forbid funding of such frills as food to cook and cloth to sew in your home economics class. Maybe vile relationship videos were all anyone could afford to give you. All I know is that, as you told me about what precious little you'd learned in class, my soul rebelled. Video and video only were my orders. You wanted to learn to work the sewing machines. The spirit of rebellion came out and I said the fateful words, "We've got thread and rags at least. We'll learn how to thread a sewing machine." I'd never have guessed such words would bring cheers, but they did.

The machines weren't much like mine and at first I really didn't know how to thread them. And so I thought out loud, "See, the cloth is bunching up. The tension is wrong, but I think I set the tensioner right, so it's likely because I threaded it wrong there, and yes, that fixed it" and so forth and so on until I could thread the machine right. Then, using the same method and reasoning, you all took turns at the machines. (There were, of course, only enough for a third of you at a time to practice.) And I wandered the room showing the same thing over and over again and found that teaching you was a delight. Your eyes lit up. The looks of utter defeat vanished. You listened. You asked questions. You were transformed from "losers" into true adults asking reasonable questions and solving the problem before you. Bizarre as it seemed given my history and skill set, I wished I could become a home economics teacher. Specifically, you were such great students I wished I could become YOUR home economics teacher, forever, not just for the day of the Great Sewing Machine Rebellion. If only I could have been your home economics teacher, none of us would ever have been losers again. I would not be a failed journalist, but a spectacularly successful home economics teacher. You would not be a bunch of doomed teenagers trapped in loser classes. You would instead be spectacularly successfully home economists, joining the ranks of greats like Grandma Yarnell and Professor Berry.

I started constructing fantasies about it just as soon as school let out. If only we had enough supplies. If only I could somehow teach and be myself and get away with it. If only I could teach without worrying about the principal and the school board, the state and federal officials, the preachers and the atheists and all the other people who torment teachers and students. If only teaching meant the free giving of learning to anyone whose eyes light up at the idea of threading sewing machines or writing sonnets or what have you. If your eyes lit up, you deserve a teacher. Every student was actually interested and actually listened. Every student got at least two minutes of my undivided attention and every student proved they were capable of learning. And all of this was possible because every one of you behaved like a good neighbor and a responsible adult. There were no games of torment the sub that day. That was a relief; but the very smart, productive and gentle way you rebelled is why I love you.

I never knew what the teacher or the principal thought of the Great Sewing Machine Rebellion. I do know that officialdom strongly disapproved of my disapproval of cheating in the Advanced Placement English class the next day. Officialdom also didn't seem to think highly of my off-the-cuff lecture on the practical uses of poetry and rhetoric either. The "slow learner" class liked it though, and so did the honest few in that cheating AP class. But my career as a substitute ended with that. I was not asked back.

Yarnell Perkins was conceived during the Great Sewing Machine Rebellion. I write as I'd like to talk to you if only we could be in home economics class again. I'm a little like your official teacher – I write about politics like she showed relationship movies – but I'm trying to write helpful hints on the relationships public schools don't dare discuss – those between bureaucrat and citizen, land man and tenant, or public school and student.

One day a few years later, as I was stewing about newspapers and work and money and the Great Sewing Machine Rebellion and the tangled webs of injustice I saw all of us getting trapped in, a woman popped into my mind. The woman conceived in your home economics revolt was about to be born. She was strange, preaching old fashioned prudence on one hand and revolution on the other. She was, mostly, the teacher I might have been if only the bureaucrats would give up and disappear. She could live and work in the pages of a newspaper, maybe, although certainly not in a modern American public school. I wrote to the editors of Hellbender Press about her. Would they like to turn her lose on the world? They would and they did. The editors of Hellbender have graciously tolerated Miz Perkins' oddities all these years, and I thank them. But the most thanks go to the instigators of the Great Sewing Machine Rebellion of '98. Before my day of miracles with you was over, I learned two things: I can never be a professional public school teacher – my mouth is just too big – but if bureaucrats were not bureaucrats, I might have made a pretty good teacher. Thank you for teaching me that.

Johnson, a long-time contributor to Hellbender Press*, resides in Knoxville.*

A 100-year-old turtle who calls the Knoxvlle Zoo its home. This turtle is one of many residents at the Zoo involved in the species survival program; story on page 14. Photo by Roxanna Shohadaee

Pushinig the choir to action

Film premiere raises awareness among viewers

Stephanie Droste-Packham

Knoxvillians loaded the seats of The Square Room music venue for more than just the free beer November 2. The complimentary food and drink augmented smiles, but it was really The LoneTones, a local folk band, and the premiere of "Coal Country," a mountaintop removal (MTR) coal mining documentary, that stole the night.

The LoneTones had patrons tapping their feet to the band's Appalachian twist on Americana while they spit emotion-driven lyrics that bit into the environmentally detrimental practice of mountaintop removal coal mining.

The evening was organized by a grassroots organization, Statewide Organizing for Community eMpowerment (SOCM, formerly Save Our Cumberland Mountains), which is headquartered in Lake City, Tenn. Their goal is to empower Tennesseans to protect, defend and improve the quality of life in their communities across the state.

In the back of the venue the band sold CDs and merchandise next to a notice that read "All proceeds go to education and charitable purposes consistent with Aurora Lights mission to raise awareness of impacts of mountaintop removal mining." Aurora Lights is a non-profit organization whose mission is to support locally-based projects that strengthen the connections within and between human communities and their natural environment.

Mountaintop removal is a coal mining practice common in the Appalachian Mountains that utilizes dynamite to remove the tops of mountains to make the coal seams easily accessible for extraction. Proponents of the practice say that site reclamation, or rebuilding the mining sites, effectively brings the land back to its original value. Mountaintop removal opponents beg to differ.

"Debris from mountaintop removal essentially fills in streams and wetlands, really where rivers start," said Cathie Bird, SOCM member. "These streams are the headwaters of a large system that affect our entire surrounding ecosystem."

Some environmental organizers fear events like these just preaching to the choir, but Bird thinks events like this one could push the choir into action.

Premiering "Coal Country" at The Square Room, a relatively new venue located in the popular Market Square area of downtown Knoxville, opened up the event to passers-by who would not have normally attended. Derek Mills of Arizona was one such passer-by.

"I had never actually heard of mountaintop removal before tonight," Mills said. "I'm surprised this isn't all over the news. Blowing up mountains? Especially since we claim to be so worried about funding for endangered owls or woodpeckers, but there are people blowing up whole mountains! It's crazy!"

The film focuses on mountaintop removal in West Virginia, giving a bit of airtime to all sides: coal companies, coal miners and citizens for and against the practice. It recalls the intertwined history between coal companies of the area and of the coal miners and local citizens. Coal Country videographer Jordan Freeman said the film took about three years to make.

"It looks at mountaintop removal in all its seriousness," he said. "While making the film, it became absolutely evident that this is something that has to stop tomorrow."

Steph Gunnoe, guitar and vocals for the LoneTones and native of Charleston, W. Va., grew up around coal mining.

"My Dad and his friends were miners; union-minded men," she said. "[West Virginia] is a morally ambiguous place because it's been owned by coal since practically the founding of the state," she continued. "It's hard to know what's right from wrong. My family is like that. They don't understand how I can speak against it."

Freeman expressed how difficult it was to find a coal miner to talk about his or her company on camera.

"It took about six months to a year to find anyone to speak out." The film interviewed many citizens who believe coal companies keep coal miners and their families in poverty to control them, a view many mountaintop removal opponents share.

David Batey, an opponent of mountaintop removal who attended the show, is hopeful for the future.

"We've never had an opportunity to do things like we do now, with our President and Congress basically on our side," said Batey. "We must insist that they manufacture wind turbine parts, solar panels and other things for renewable energy. If we put the right pressure on, we can fix the environment and the economy at the same time."

Freeman said the idea he had when coming up with the film was to create a national dialogue on this issue that has been hidden behind other issues for too long. With more events like this one, mountaintop removal opponents may have a shot. Open and welcoming events with food, drink and live music, combined with a quality message to take home, this choir just might be pushed over the edge to act. Batey agrees with enthusiasm.

"We can do it; I know we can."

Stephanie Droste-Packham is a senior in environmental studies at the University of Tennessee. She can be reached at sdpackham@gmail.com.

Transportation can be healthy

Jim Hagerman

We bike advocates are always ready with our list of reasons to ride bikes: bike riding promotes health and fitness, saves money, saves the environment and it is fun. Each of these would be good subjects for columns, and in the future I plan to discuss each one. I will start with the first reason on the list, cycling and fitness.

We have been told all of our lives that we need exercise. Experts tell us that regular exercise improves our mood; helps prevent and control a range of chronic diseases, such as high blood pressure, diabetes, osteoporosis and certain cancers; helps us manage our weight; helps us sleep better; and gives us more energy for everyday activities as well as for recreation (including sex).

The benefits of basic fitness are available by spending only 30 minutes a day, five days a week, in medium-intensity exercise, such as cycling.

But even this relatively small investment in time and effort is difficult for many of us. From cars to elevators to electric pencil sharpeners, modern technological society eliminates nearly all physical effort from our lives.

Our demanding schedules make it difficult to squeeze in a daily trip to the gym or even a walk around the neighborhood. Even for those who can find the time, exercise for the sake of exercise is fundamentally boring.

In spite of the physical benefits, walking or pedaling on a machine that goes nowhere or picking up weights just to put them down again can feel like the very definition of futility, especially when we have to do it day after day to realize those health benefits. This combination of time pressure and boredom has defeated many well-intended exercise programs.

The best way to guarantee that you get regular exercise is to build it into your life and routine, and one way to do this is to power our own daily transportation.

Bike commuting is a great way to do this.

Bike riding is a gentle exercise that is easy on the joints. Because the muscles that are doing the work do not have to support body weight, cycling makes it relatively easy to develop endurance and gain cardiovascular and weight control benefits. And cycling is great for the legs and lower back.

Cycling is not a perfect exercise. It does not do much for the upper body, nor does it help much with bone density. The ideal training program would combine cycling and resistance exercises and some walking or running, but that sounds too much like the exercise program that we do not have time for.

But regular bike riding does provide enough basic fitness that we can enjoy the walking and the stair climbing we used to avoid, and we can work longer in the yard and use the muscles we missed on the bike.

Bike riding for fitness does not require a special bike, but it does require a bike that is in good repair. A bike that fits well and is adjusted to be comfortable and efficient for the rider will make riding pleasant and prevent injury.

Gearing that is low enough to get you up the hills of your daily ride will mean that riding does not feel like a chore on those days when you do not feel frisky. Since the goal is regular exercise integrated into daily life, lights for the short days of winter and fenders for wet weather are important for safety and practicality.

A person who rides strictly for the daily commute will gain most of the benefits of basic fitness, but it can be fun to take it farther.

Exploration of back streets and new routes will open up new possibilities for using your bike, both for errands and recreation. And for those days you just need to blow off some nervous energy after work, it is nice to develop some long-way-home routes.

Bike commuting can be the base for a higher level of fitness. Add a longer weekend ride on top of your regular commute and you will be ready for adventure. My 40 or 50 miles per week commuting and running errands plus a weekend country ride gets me to a level at which I can readily do a leisurely century or take off on my bike for a camping trip. I can also go on a long hike or a canoe trip without any problem.

Going fast – keeping up with fast friends, doing a fast century, or maybe even trying competition – requires training techniques that go beyond the scope of what I have room to talk about here, but there are many books and magazine articles to explore on the subject.

Going fast on the road requires a weekly rhythm of training for endurance, speed and recovery. It can be very demanding and also intensely fun and rewarding. Most of us cannot maintain such a demanding regimen for long, but if it is built on a foundation of using a bike for transportation, we will always have that base level of healthy fitness.

Hagerman is an environmental engineer who lives in South Knoxville and gets around mostly by bike.

Learning at the Petascale

How researchers harness the power of two quadrillion calculations per second

Wes Wade

The official announcement came sometime between 5:30 and 7 p.m. pacific time at the International Conference for High Performance Computing, Networking, Storage and Analysis (SC) in Portland, Ore., Nov. 17, 2009. The National Center for Computational Science's (NCCS) supercomputer named Jaguar has topped the list of the world's 500 top supercomputers.

Jaguar, located at Oak Ridge National Laboratory (ORNL), is one of two petascale machines at the lab ("peta" meaning "quadrillion"). The fastest supercomputer in the world uses a technique called parallel processing, where multiple processors carry out calculations simultaneously, putting its theoretical peak performance at 2.3 quadrillion calculations per second.

Mitchell Griffith, a member of the Scientific Computing Group at the NCCS, compares the process to strawberry picking. "So you have 14 rows in a typical plot of a strawberry patch," said Griffith. "If one person does it, to finish the entire field may take three days. If you get 14 people to do it, they work in parallel, and it takes only the length of doing one row to get the work done."

Although Jaguar is now equipped with more processors, utilizing them is not a plug-and-play process. Loukas Petridis, a researcher at the University of Tennessee (UT)/ORNL Center for Molecular Biophysics, recently dealt with this issue when his team, lead by Principal Investigator Jeremy C. Smith, used Jaguar to simulate the structure and behavior of lignocellulose, a plant biomass that can be converted into the renewable alternative energy bioethanol.

Additional processors offer more speed and power for simulations, but Petridis mentions that scaling codes to many thousands of processors is difficult. His team's simulations were rendered using a molecular dynamics (MD) code called GROMACS. MD codes describe the motions and behaviors of atoms that otherwise cannot be observed and researchers in every field use them or similar codes to construct simulations.

"When it comes to a computational approach, to using computer simulation, there's an extra challenge which has to do with the amount of atoms," said Petridis. "We're [his team] are working with three to five million atoms." A simple protein suspended in water would consist of approximately 100,000 atoms. By comparison, the lignocellulose biomass the team hopes to understand is a large, complicated system consisting of many millions of atoms, interacting with one another in multiple ways, making it difficult to describe mathematically.

To describe how this material reacts, or how all these atoms communicate with one another to make the biomass behave the way it does, Bronson Messer, an astrophysicist in the NCCS' Scientific Computing Group, compares the plant to a float in a parade.

Imagine this float as it rolls down the street, decked with pinwheels, flashing lights, buttons, dials and lawn gnomes. The pinwheels turn in the wind. Sometimes clockwise. Sometimes counterclockwise. The lights flash on and off intermittently and in various orders and time lengths. The buttons are pushed at random. The settings on the dials move back and forth along the numerical scale from one to 11. Even the lawn gnomes are in on the act, doing whatever it is animated lawn gnomes do. And each one of these actions determines how the float moves down the street: fast, slow, left, right, forward, backward, diagonal. The atomic interactions of the lignocellulose are much more complex and its reaction to certain pretreatments used to break the plant mass down into useable components for fuel had to be simulated as well.

To complicate matters, the team needed to observe these atomic interactions at the nanometer length scale. They began at one nanometer, or roughly one ten thousandth the size of a human hair. They then moved up sequentially one micrometer, which is the largest scale that can currently be observed through computer simulation, observing at each length scale the behavior of lignocelluloses as it was broken down into glucose.

To describe atomic interactions researchers rely on a variety of methods that use approximations to predict behavior, and they are combined with MD codes to describe the system as a whole. Petridis' team found that one method, known as the reaction field (RF) method, is faster than other commonly used equations when dealing with multimillion atom systems.

Researcher Roland Schulz was also able to optimize the load balancing of Jaguar, so that each processor, 37,376 total, worked in unison.

"This is not trivial," said Petridis. "Most of the time in calculations you have some computers [processors] doing most of the work and this slows down the computations."

Schulz' load optimization augmented the team's code to run in under half the time of similar simulations.

This is important when time is not on your side.

Jaguar is typically allocated to over 60 research projects a year. Petridis' team was allocated more than 30 million computational hours, which would take one person, sitting at home with their books and working by hand, roughly 1,875,000 days to accomplish what Jaguar has in a few months. "Of course we would be dead by the time the calculations finish," said Petridis. So of course, they rely on Jaguar.

Although additional processors mean additional speed, there is a plateau, where additional processors will no longer benefit. According to Arnold Tharrington of the NCCS' Scientific Computing Group, additional processors can actually hinder calculations. Like too many people packed into a room, trying to work together, the processors will eventually become disjointed and begin to hinder one another.

An additional benefit of using RF and GROMACS as opposed to other equation/MD code combinations is that this plateau is much higher. So their code can make use of more processors before efficiency declines.

These improvements to the scalability of GROMACS have potential for other areas of research as well, not to mention adding to the general understanding of petascale computer architecture.

"GROMACS is kind of a community code used widely here and especially in Europe," said Donald Frederick, a member of the NCCS User and Assistance Outreach Department. "It has applications not only for bioethanol, but for drug discovery, fundamental chemical processes at the molecular level, and it has applications for all kinds of living organisms." Improvements could radiate in the scientific community for years.

The team published a paper on their research this past September. Though Petridis has since spoken with members of the scientific community about his team's results, it is too early to say how their improvements will be

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Thinking Globally

Stephanie Turner

Belugas get protected habitat
Environmental news at the moment proves that it is never too late to amend bad policies and practices. Particularly in the interest of an endangered species and a threatened population, this adage could not be more appropriate. The National Marine Fishing Services plans to set aside 3,000 square miles of protected habitat for the Cook Inlet beluga whale off the coast of Alaska. Not surprisingly, this ethical act arises out of an overdue lawsuit between two state agencies.

The Center of Biological Diversity sued the National Fisheries Services after the Fisheries put off habitat protection for a year. The Cook Inlet beluga whale is one of five species of white whale, and what once was a population of 1,300 in the 1980s, now has faced significant decline, down to 300 over the past 20 years. Local industrial growth and overhunting are contributing factors to this decline. The Cook Inlet will nevertheless be afforded more protection than it previously had.

Holy water to be cleaned
Purifying holy waterways for a portion of the Indian population is made possible by a one-billion dollar loan from World Bank. The Ganges River, considered a sacred place in Hindu culture and also one of the most polluted rivers in the world, will hopefully be clean and safe enough for human contact in five to seven years.

The river flows from a Himalayan glacier but in more urban areas becomes inundated with untreated waste and other biological hazards. It is estimated that by 2020, the Ganges will be waste-free.

Gaseous waste management
On the eve of Copenhagen's greenhouse gas curtailing and proposing a change of atmosphere on climate change, one Denmark municipality has been doing the right thing in waste management—in the form of greenhouse gas management—for over 25 years.

In the early 1970s, the town of Aalsborg's organic waste management system mandated what amounts to household composting and burning organic waste for heat and power. Thus instead of 80 percent of waste emitting greenhouse gases (GHG), it experiences GHG turnover and is, in a sense, converted to energy.

On a larger scale, the European Union has done its part to reduce GHG emission from 64 to 28 million tons of carbon dioxide per year between 1990 and 2007. It seems that GHG conversion in waste management perhaps leads to one less carbon footprint.

Trees for Palestine
Palestine has long been deprived of a truly 'planned' city, among other luxuries. Now, not only will the city of Rawabi have a structured community with sidewalks and significant green space, it will also be lined with newly-planted evergreens. The development project is titled 'Grow-for-Greener Palestine.' This will also mean that Palestinians will benefit from the first forest planting in 42 years.

Climate in Copenhagen
Acknowledgement of the world's climate crisis and objectives to combat atmospheric carbon dioxide expelled by the burning of fossil fuels have been and are still being hashed out at the UN's Copenhagen conference.

The conference's main objective is to economically and diplomatically force nations to drastically scale down GHG emissions, hopefully cutting them proportionally in half by 2050. This objective has stalled slightly due to some developing nations' insistence that wealthier countries offer up a more substantial financial commitment.

In the actual proposal, the ambitious initiative lacks clear indication of just how much wealthier countries would be expected to pay out. China feels that developed nations need to deliver an uncompromising stance on funding so developing nations' can more feasibly make the necessary sacrifices.

It is thought that developed nations need to project a 25 to 40 percent cut in emissions from 1990 levels, more than the currently proposed range of 14 to 18 percent. The U.S. has put forth an overly modest plan of a 17 percent decrease from 2005 levels, which only amounts to a 3 percent decrease of 1990 levels.

Powering the islands
Some Pacific island nations, like those of Papau New Guinea, are already succumbing to the effects of rising sea levels and thus urgently wish to see significant emission reductions. In the Carteret Islands group of New Guinea, the small atoll of Piul is now afflicted with king tides that flood the shores two or three times a year and saturate crops and homes. Sweet potato and the staple starch taro can no longer be grown due to the increased salinity of the soil. Many islanders are beginning to relocate and are now forced to subsist on less staple items such as fruit and fish.

Yet some speculate that these sudden shifts present a golden opportunity for Pacific Islanders to become leaders in sustainable energy. Fiji operates on 66 percent hydropower, and Tuvalu has already set a goal of relying on 100 percent solar power by 2020.

Freshwater trees store carbon
Amid the frenzy to limit atmospheric carbon, another simple, inexpensive, and until now, little-researched solution can be found in ancient oak trees submerged in freshwater.

A study conducted by the University of Missouri reveals that freshwater trees can store carbon up to 2,000 years, much longer than their fallen forest companions. Northern Missouri is unique in its abundance of riparian forests, which are forests that allow the natural flow of water. Throughout the course of this study, researchers found oak trees dating back 14,000 years, thought to be some of oldest in the world.

When non-submerged trees die and begin to decay, they release carbon into the atmosphere. Trees submerged in water essentially stifle this carbon release, and act as additional natural buffer in the effort to sequester carbon.

Turner graduated from UT in 2009 with a degree in English. She can be reached at stephanie7743@att.net.

Green Justice

A letter to my environmental colleagues in the Obama administration

Dean Hill Rivkin

The Obama Administration promises a new era of environmental protection. The appointments to top positions in the Administration—the White House, the President's Council on Environmental Quality (CEQ), EPA, the Department of Justice, the Department of Interior, to name a few—herald a seismic shift in the attitude of the federal government toward this nation's environmental laws and policies. Many of the new appointees are colleagues—people I know – from academia and the public interest environmental law community. Based on my nearly 40 years in the field, this is what I am saying to them:

"You have an opportunity, indeed an obligation, to rebuild (please don't use the buzz word "reinvent") the faith of the grassroots in this country's commitment to a sustainable, healthy environment for all. The last eight years eroded any residual trust in the ability of the federal government to act in the public interest. Not to be naïve, but your job will be to resist the narrow, private agendas of the interests that have dominated the environmental scene in Washington for many years. This will require a sea change in policy-making and politics. Here are some principles to guide your mission:

1. In all your complicated work, honor two foundational principles: the precautionary principle and the principle of intergenerational equity. Each time you review a new law or regulation, bring an enforcement action, negotiate a settlement, advocate in the international sphere, please err on the side of protecting public health and preserving options for future generations. In your zeal to correct the abuses of the past administration, do not move so fast that the inevitable compromises that you will have to make will contravene these over-arching concepts.

2. Think of yourselves as human rights or civil rights workers. As technically forbidding as environmental law and policy is, do not overlook the justice implications of your work. The environmental justice movement in this country has steadily grown because its normative claims ring true for a majority of ordinary people. International environmental human rights work has blossomed because the stark harms to disempowered people all over the world diminish us all.

3. Form unlikely alliances to further your goals. Reach out to organized and unorganized labor, to faith-based communities, to those in the scientific community who were silenced, to civil and human rights organizations, to youth, to seniors, to cultural leaders and others who do not comprise the elite. Being in Washington, as you know, can make you myopic; relentlessly broaden your horizons.

4. Respect the views of your counterparts in States and localities that have led the way in innovative policies on air pollution, land use, energy conservation, transportation and a host of other important spheres. For years, these officials have been in an adversarial stance toward your agencies; listen to them carefully—as some of you know who have worked at this level, acting locally can produce lasting, long-term change as surely as your work on the federal level can.

5. Immediately address the incandescent abuses of the past administration (this is already happening in some of these areas): mountaintop removal strip-mining, coal waste (ala TVA), hazardous air pollutants, despoliation of federal lands, sacrifice of endangered species and the list goes on and on. Such prompt action will help restore confidence that you understand the anger and frustration that welled up over rules and policies that were guided not by considerations of environmental protection and sustainability but—to use the cliché of the day—greed.

I hope that these brief thoughts are not too preachy. I am sure you have thought of them yourselves. But there is not always a confluence between thinking and acting. Many of us will be watching. You'll hear from us—good or bad."

Rivkin is a professor of law at the University of Tennessee.

Nuclear Knoxville?

Citizens urged to learn more about nuclear waste

Ian Hedges Lycke

There is little doubt that the kind of scientifically-innovative industry Oak Ridge brings to this region is both proudly embraced and viewed with reservation.

The nuclear facilities within Oak Ridge generate jobs and economic stability for the small city nestled in the Tennessee Valley. The Department of Energy houses its largest laboratory in Oak Ridge—Oak Ridge National Laboratory (ORNL). One arm of ORNL must handle toxic nuclear substances as well as the waste from these substances. Thus dealing with the environmental consequences of nuclear waste becomes a part of the honorable research taking place.

A recent concern about the state of K-25, a uranium enrichment plant built in 1942 to accommodate the Manhattan Project, illustrates the justified concerns area-environmental activists have and citizens of Oak Ridge and greater Knoxville should have.

At the time of its construction, the K-25 building was the largest facility to manufacture uranium components used in nuclear weapons. Nuclear manufacturing continued until 1985 when the DOE determined that K-25 did not meet modern regulations.

However, the DOE has allowed the officially-extinct building to fall into disrepair. The roof has somewhat collapsed and inadequately shields the equipment left inside the building. Now that the DOE has ordered the plant's demolition, the equipment it houses must be eliminated simultaneously for health reasons. The inspection that found the equipment in this state was performed in 2004, almost 20 years after the initial closing of K-25. This span of time has given the upper-hand to contamination of water run-off; and if exposure to the equipment within the building is dangerous, the moderate amounts of radiation that have found their way into the surrounding environment during the past 20 years poses a far more significant threat.

Plans for doing away with K-25 were initiated in 2004, and in 2008, demolition begin. Today, the DOE's regulations require the removal of active uranium and the use of polyurethane foam to contain the radiation from run-off. The K-25 plant cannot retroactively benefit from these modern, responsible standards. Several other uranium enrichment plants will likewise have to undergo demolition due to the DOE's newer regulations. As a community we must be aware of the condition of these nuclear facilities in our backyard. We must also educate ourselves about the demolition of nuclear plants and proper disposal of nuclear waste. Given our close proximity to nuclear facilities, it should be a conscious priority to maintain and monitor the health of environment and ourselves in this regard.

Lycke is a student at The University of Tennessee.

Make Saving the World Easier

Julio Custode

The environmental movement in America has become undeniably prevalent in our current day pop culture and values. Everyone can see this fact in commercials and public relations campaigns, which work to convince the public of the importance of issues like green power and recycling. Despite all the convincing messages out there in favor of recycling and the fact that most people have a favorable opinion of it, there are still a significant number of households that do not recycle. Recycling has been proven over time to reduce the amount of garbage in landfills, and provides materials for making many commonly used products.

The most common reason I have discovered for not recycling is that it is inconvenient. People are simply not motivated to drive their garbage to a drop-off location. For this reason I think that cities like Knoxville should provide more recycling drop-off locations to better handle increasing quantities of recyclables. Making recycling easier for people in Knoxville is an important step towards achieving local sustainability.

Recycling is a practice that is undeniably beneficial to the environment. According to a 2005 EPA study, Americans generated about 246 million tons of garbage that year. Of that, 79 million tons (31.1 percent) is recovered through recycling. This still leaves 167 million tons to be disposed of in landfills around the country. To put that number in perspective; the US alone buries the weight of 4,175,000 fully loaded tractor-trailers every year.

Among the things commonly thrown away, plastic bottles are probably the most harmful to the environment, but are easily recycled. Consumption of beverages in plastic bottles doubled per capita from 10.5 gallons in 1993 to 22.6 in 2003. Plastic also takes up to 1,000 years to decompose which makes its effect on the environment considerably worse than other materials. Plastic bottles are also made of petroleum which means that the more we recycle them the less oil we will require from foreign sources. There is a simple way to reduce these startling, but it is only possible if more people make it a personal habit to recycle.

If I were to approach an average person on the street and ask them what their general feelings on recycling are, I can confidently say that most people would claim to in favor of it. However, if I then asked them if they themselves recycle in their own homes I would probably find that less than half of those in favor of recycling actually do. There is a simple reason that accounts for this inconsistent fact. Recycling takes a certain amount of effort of the part of the person doing it. If you then ask the same person why they don't recycle, they will most likely tell you that it is considerably inconvenient and they would have a good point. In the city of Knoxville recycling is inconvenient for almost everyone except those who live near one of the few recycling drop-off locations. The solution to this problem is very simple. The best way to make recycling more convenient is to increase the number of drop-off locations. This would not only reduce the distance people would have to travel to recycle but also increase capacity.

I have personally experienced problems with the inconvenience of recycling in Knoxville. I currently reside in the Fort Sanders area with two roommates. As a long time recycler I will put myself through the necessary inconvenience to drive my recycling to the nearest drop-off location downtown. This is more than I can say about most other people in my apartment and my roommates. Most of the people in my building do not seem to recycle at all and many of them don't have cars. Without a car it is considerably more difficult to recycle in the Fort. One would have to carry their bags of recycling all the way downtown, which would be considerably more difficult than transporting it in a car. The convenience of recycling is directly related to the distance one must travel to do so. If there were a recycling drop-off location in the Fort the excuse of inconvenience would be eliminated and more people would recycle there.

As if to add further inconvenience to recyclers, in Knoxville the scarcity of drop-off centers has created an overflow problem at the ones that already exist. In fact, most of the time I go there at least one of the containers (most of the time the cardboard) is full or overflowing. When this happens I must either hold on to my recycling until the container is emptied or drive to another location hoping not to find the same problem.

Clearly the demand for places to recycle in Knoxville is higher than the supply of places provided by the city.

If change is to be made concerning environmental issues, people must start at the local level and work their way up. The city of Knoxville would see a sharp increase in recycling if it were to double or even triple the number of drop-off locations throughout the city. The best part of making change on a local level is that every letter written to representatives is paid more attention than on a statewide or national level. So if you agree that recycling in Knoxville should be more accessible to everyone and that drop-off locations should be a more common sight in our fair city, then I highly encourage you to write to your local representatives. The wheels of government turn slowly, however, with enough voices behind an issue it becomes impossible for them to be ignored.

Custode is a student at The University of Tennessee.

Regenerative agriculture: reconnecting to nature

Tracie Hellwinckel

Many 'green concepts' have morphed into buzz words for today's general populace. Terms like 'green,' 'eco,' ' all natural,' 'sustainable' and 'organic' do not depict a lifestyle that is intricately connected with the planet. They do not make a person aware of how their purchasing choices affect Earth's natural systems. Regenerative agriculture may seem synonymous with many 'green' terms, but it embraces more.

The term 'sustain' means to maintain or to keep from falling or sinking. Whereas the term 'regenerate' means to breathe new life into [something], denotes renewal of materials and creates systems that sustain and maintain themselves. Sustainable might be used to help define regenerative agriculture, but a regenerative system does not just maintain, it stimulates, rejuvenates and resuscitates renewable sources by integrating the needs of society with the integrity of nature.

Photo by Tracie Hellwinckel

Backyard gardening is just one of many ways to reconnect with nature.

The USDA credits Robert Rodale for coining the term Regenerative Agriculture. In 1990, Rodale gave a lecture at Ohio State to a group of agriculturally minded people on the topic of sustainability. He stated that those who work with, not against or ignoring, the land have a close relationship and accountability with Earth. He accredited Nature, "the creative and controlling force in all of the universe" for gathering them. He claimed that because they were intricately involved with Nature, they heard the call to attend that particular conference. Nature led and inspired Rodale.

Making a garden and growing vegetables does not define regenerative agriculture, though if one chooses, it could be a step towards becoming acquainted with it. Through regenerative practices, we recognize Nature in the garden; how the garden flows with microscopic life and energy. The garden does not stop at the top of the highest plant or at the soil line. It is not a separate entity. The garden's energy expands beyond its actual physical boundary to have its needs met and to meet the needs of other life forces (i.e. bees).

Nature's energy pulses through every living thing. The fossil-fuel-reliant industrial system depends on vast amounts of energy without giving anything back to the system. It strips the land and creates unhealthy ecosystems. There is no accountability. A regenerative system shows accountability to Nature by using natural, diverse and gentle techniques. When practicing regenerative techniques, the gardener constantly replenishes so the system stays intact and healthy. By working with Nature instead of against, life is naturally simplified. Practicing regenerative techniques not only redeems our farming grounds, it also restores our souls.

According to psychologist Abram Maslow's hierarchy of human needs, it seems that humans' greatest need is to reach transcendence, which is the need to help others self-actualize. One can not transcend if one has not self-actualized, and neither transcendence nor self-actualization can occur if the six lower needs have not been fulfilled. The lowest human needs, which seem to have the highest demand, are basic needs like drinking, eating and excreting, sleeping, shelter, sex, etc. In today's world, the industrial system makes the fulfillment of these needs rather simple, which perpetuates the idea that we humans should find it easier to work towards fulfilling other needs, including self-actualization. But the truth is the conveniences of the industrial system detach us from Nature leaving us to pursue the attainment of higher needs without any true consciousness of ourselves and our basic needs. It is Nature that grounds us. It is through working with Nature to meet our most basic needs that we begin to understand ourselves.

Regenerative agriculture reaches a basic need in us: to survive; to reach within ourselves; to become free of harmful environmental practices by living off the land in a most fundamental way and to restore the world around us.

If we stripped ourselves of the industrial system and placed our naked bodies in the middle of the land, regenerative agriculture would lead us to transcendence. Every need and niche is filled because we blossom by respecting and working with the land, by touching earth and becoming one with the force of Nature. Regenerative agriculture is more then reading a book and saying, "Yah, okay." It requires both thought and action.

We may begin our journey with terms like 'green,' 'all natural,' 'eco,' 'sustainable' and 'organic,' or through local food movements and gardening, but as we take time to learn and grow; we see that those are smaller pieces to a much larger universal puzzle. Expanding your realm, coupled with embracing and practicing regenerative agriculture, can lead to higher levels of awareness, which ultimately brings the soul back to Nature, the universe's creative controlling force, as Robert Rodale, the father of regenerative agriculture, stated.

Hellwinckel publishes The Agraian Urbanite*, a manual for regenerative urbang agriculture. She lives in Knoxville.*

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Hiking through the ancient poplars

Scott Noethen

Joyce Kilmer Memorial Forest is described in an early U.S. Forest Service publication as one of the few remaining examples of the great hardwood forests that covered the Appalachian mountain slopes when Christopher Columbus discovered the New World. Joyce Kilmer Memorial Forest is considered the last great stand of virgin tulip poplar forest east of the Mississippi River. I consider it one of the best day hikes in the region.

The forest is dedicated to poet Alfred Joyce Kilmer (December 6, 1886 – July 30, 1918). Kilmer was a journalist, lecturer and poet who enlisted in the New York National Guard at the outset of the First World War. He was believed to have been killed by a sniper at the Second Battle of the Marne while scouting the location of a German machine gun. Joyce Kilmer is best known for his poem, "Trees."

The trail is laid out as a rough figure-eight situated in a south by southwest direction. I hiked two miles round trip by taking the left side of the lower loop and right side of the upper loop. In the middle, where both loops meet, there is a large rock with a memorial plaque dedicated to Joyce Kilmer. The trail is a very easy hike and recommended for families and individuals of all ages. At a very leisurely pace, it should take no more than two hours.

However, the overall ease of the trail is not apparent at the beginning of the hike. After you cross the bridge over Little Santeelah Creek, the first third of the trip is a gradual uphill climb through thickets of rhododendron and, eventually, mature boreal forest. But steps built into the trail and foot bridges over brooks help establish footing. The footpath is very well maintained and wide enough for two in spots. There are many sites to rest or take a photograph next to one of the ancient tulip poplars.

During the spring and summer, the forest floor is covered with the rich green of mosses and ferns and vivid patches of colors from wildflowers such as bloodroot, crested dwarf iris, painted trillium and bluets. Wildlife includes salamanders, songbirds, squirrels, chipmunks, deer and possibly, if you are lucky, a black bear here or there. Eventually, a combination of almost imperceptible switchbacks will transport you into Poplar Cove, a grove of the largest old-growth trees, where I counted over 30 tulip poplars, 15 to 20 feet in diameter, over 120 feet tall and at least 400 years old.

Once you reach the top of the switchbacks, the trail levels out and you can concentrate on sounds other than the blood rushing through your temples. I was mostly focused on the trickle and gush of the water as I strolled down the trail into the lush rhododendron and finally along the banks of Little Santeelah Creek before I arrived at the parking lot where I packed it in for the picturesque ride home.

Directions

Joyce Kilmer Memorial Forest is located in Graham County near Robbinsville, N.C. The most scenic directions from Knoxville are south on Highway 129 to Highway 143 (Cherohala Skyway/Massey Branch Road) west. Once on Hwy 143/Cherohala Skyway/Massey Branch Road, follow the road about 12 miles and turn right onto Joyce Kilmer road. Signs will direct you to Joyce Kilmer Memorial Forest Trailhead. The entire road trip is about 75 miles one way. Once you reach the parking area, you will find a picnic area, flush toilets and an information kiosk.

Please remember to practice **Leave No Trace** principles, which mean you should leave everything as you see it. Bring all the necessary equipment, including rain gear, as well as plenty of snacks and water. Wear comfortable clothes and shoes, take lots of photographs, enjoy your time and breathe the fresh mountain air. Essentially, expect the best, yet, prepare for the worst.

Noethen resides in Knoxville.

Trees

I think that I shall never see
A poem as lovely as a tree.
A tree whose hungry mouth is prest
Against the earth's sweet flowing breast.

A tree that looks at God all day
And lifts her leafy arms to pray.
A tree that may in summer wear
A nest of robins in her hair.

Upon whose bosom snow has lain.
Who intimately lives with rain.
Poems are made by fools like me.
But only God can make a tree.

Joyce Kilmer

Green Roof Overhead

The University of Tennessee Knoxville will be getting more green space in an unusual area next year

Jordan Norton

Walk down Jacob Drive past the Agricultural Campus (Ag Campus, for short) at the University of Tennessee, Knoxville (UT) past the Forestry Products Resources Building next to the University Gardens. To the left, under a large wooden arbor, you will find a scale model of one of the newest environmental techniques UT will be practicing next year.

It is a shed with a 'green roof,' or a roof covered with vegetation and soil planted over a waterproofing membrane. Though it is small, it shows people what can be done with a little architectural ingenuity.

Carpentry students from Byington-Solway Technical Center built the shed and the roof was made by an Environmental Science class from Karns High School in the spring of 2009. Living Roofs, Inc., a company that designs green roofs, provided the high school students with technical support for their project. Part of the idea for the project came from Karns High School students who were researching the benefits of installing a green roof at their high school.

Make Orange Green, an on-campus organization that promotes and coordinates environmental stewardship activities at UT, is working on the installation of a green roof on the Knoxville campus. The group believes this project will beautify a seldom-used public area while using an energy saving technique. The money for this project will come from the Green Fee, a part of tuition that students pay when they come to the university. Five dollars per semester for in-state students and $30 dollars per semester for out-of-state students, the student-initiated fee was passed in spring 2004 to fund green projects all around campus.

"The plan is to beautify the bridge area that runs between the Communications building and Andy Holt Tower through the use of planters and some hanging baskets with flowers along the way," said UT Sustainability Manager Gordie Bennett. "The green roof will be installed on the southeast side of the Communications building, on the same level as the walkway to Andy Holt Tower."

The project has a budget of $50,000 and still requires some more planning, but work will likely begin in summer 2010. Make Orange Green will be starting with the beautification of the bridge and the remaining funds will be used to purchase the green roof materials.

Green roof materials can come in several different forms. One of these is Extensive, which is about five to six inches of soil, best for grasses. Another is Semi-Intensive, about six to seven inches of soil, which can sustain grass and some shrubs. Finally there is Intensive, which is about 12 inches of soil and can sustain grass, shrubs and even trees. Make Orange Green is leaning towards a Semi-Intensive green roof, which would run about $10-$20 per square foot. This means they could end up having about a 1,000 square foot area. Local vegetation such as grass, shrubs, hedges and trees will share the space with all those who will use the area for breaks in a beautiful area, especially in the spring.

The extra insulation provided could save energy throughout the year with the only true energy user being lights installed in the area for night use. Make Orange Green is looking into energy efficient lighting options such as super-efficient LED light bulbs and solar powered lamp posts to power the lights at night.

Photo by Jordan Norton

The green-roof project at The University of Tennessee helps promote Make Orange Green's mission of bringing sustainability across campus.

Green roofs offer innovative rain water management solutions in addition to its energy saving aspects. Much of the green roof material absorbs rain, which can reduce the amount of run-off water around the area. The excess rainwater can then be diverted into storage barrels or tanks and be reused to irrigate the roof during dry spells.

Green roofs also provide a habitat for wildlife usually lacking in an urban area like Knoxville. Additionally, green roofs can help to increase the life of a roof, reducing overall costs on building maintenance over time, and improve air quality as the plants absorb many pollutants and particulates in the air. UT hopes to take advantage of these benefits after the project is complete.

Make Orange Green expects that construction will not take as long as the planning and design, much of which involves undergraduate and graduate students from the agricultural department at the UT. Once everything is laid out and ready, they will accept bids from several companies, including Living Roofs Inc., and take the lowest. Green roofs often come in the form of square patches of pre-seeded turf-like material, so construction is not expected to be a problem. The roof renovations to the communications building are expected to be finished between summer and early fall 2010.

Students and visitors interested in sustainable practices can keep up with what is happening in the area of sustainability and environmental activity on campus on Make Orange Green's website: www.environment.utk.edu.

Norton is a sophomore at UTK and majors in Environmental Studies while working with several different environmental groups on policy and education initiatives.

Students nationwide virtually visit national park

Eric Gedenk

In today's world, one would think that to combat such issues as sustainable power in homes and transportation, global warming, pollution, and mountaintop removal, the solutions must come in equally formidable packages. Yet sometimes a more simple-minded and small source can affect the most change.

Recently the Great Smoky Mountains National Park service paired up with the National Park Foundation, the UPS Foundation, and Apple Inc. to host a live electronic field trip for students nationwide Tuesday, November 3.

The field trip was free for all registered classes. The UPS foundation donated $125,000 for the event, and Apple hosted the web streaming.

Schools in forty states representing over three million students participated in a live broadcast of park rangers and local student "hosts." The program was designed to acquaint student viewers with the incredible species diversity contained in the GSM national park and how more than 17,000 plant and animal species within the Smoky Mountains interact and depend on one another.

Nancy Gray, representing the National Park Service in the Smoky Mountains indicated that the National Park Foundation felt that this field trip would be a fitting way to celebrate the GSM's 75th anniversary.

"We felt that this was a perfect opportunity to showcase the park and to expand our environmental education program," Gray said.

Gray explained that after classrooms registered for the field trip, they gained access to six learning modules, lessons plans, and interactive games for the students to become familiar with some aspects of the varied ecosystem before watching the live broadcast.

Gray felt that the project turned out to be extremely successful after much careful planning and coordination and hopes similar educational opportunities will present themselves for the GSM.

Photo by Matthew Willings

Students Aunlea Wilkinson (left) and Kelly Green (right) participated in the virtual field trip with their teacher, Casey Berg (center).

Casey Berg, science teacher at Wearwood Elementary School, allowed two of her students to participate in the program and could not have been more pleased with the outcome.

Berg, who participated in the Teacher-Ranger-Teacher (TRT) program over the summer, is passionate about GSM conservation and is a large proponent of increasing awareness of and knowledge about the park using more resourceful means, like a virtual field trip.

Berg felt the most important lesson that participating students could take with them was their ability to "make a difference. You don't have to be a biologist to help."

Aynlea Wilkinson, an eighth grader, and Kelly Green, a sixth grader, were two of the students selected to host the broadcast to classrooms across the country from the park's Twin Creeks Science and Education Center. They both enjoyed the entire experience.

"I love the creek, and that's where I was," Green said, referencing working with park rangers in a demonstration of a few, key indicator species from East Tennessee: Salamanders, Mayflies, and Stoneflies.

When asked if there was anything that could have been added to the experience, Wilkinson firmly stated that, "They did practically everything we wanted." Berg was proud of her students for doing their part in showing "a whole gamut of bio-diversity," to students living a considerable distance away from the ecosystem that cradles Wearwood and many of her students' homes.

"I love the park, and the more students get involved, the more they will want to help clean up their backyard," Berg said. She hopes that the virtual field trip concept will take hold in other scientific categories:

"I would love to see geology, geology is where it starts."

The success of the program shows that the world's growing environmental crises can be tackled not only by those in power now but by successive generations and the leaders that emerge.

Both Wilkinson and Green said they feel more adamant about protecting the mountains than they did before. When asked to make a statement to other park visitors, both offered candid calls to action:

"Protect our animals!" Green said, while Wilkinson urged locals to "participate in trash pickups."

Hearing the students discuss their experience brought a smile to Berg's face, and when asked about the change she has seen in the students, she happily responded, "They are more confident in telling others what they're passionate about."

Berg represents just one of many educators who sees her students as more than children. She sees them as future advocates for the respect and protection of the GSM national park and other 'virtual' ecosystems beyond.

"They are much more aware as kids and see how they can educate the world."

Gedenk is a junior at The University of Tennessee, majoring in Journalism with a concentration in science writing. He can be reached at edgedenk@gmail.com

Quote of the Issue

Time is but the stream I go a-fishing in. I drink at it; but while I drink I see the sandy bottom and detect how shallow it is. Its thin current slides away, but eternity remains. I would drink deeper; fish in the sky, whose bottom is pebbly with stars.

~From Walden, by Henry David Thoreau

The Great Sewing Machine Rebellion

Kathy Johnson

Dear home economics students of Our Old High School:

I am writing to thank you for the day I spent as your substitute teacher in 1998. When I got to the school for my first day of subbing, I saw that nothing much had changed since 1979, when I left Our Old High School intending never, ever to return. Certain qualities of the school had intensified, though. The frequent surprise searches of our lockers by the local police had been intensified with a high fence around the school and police presence around the clock, openly declaring what the students had merely felt 20 years before –the place is more or less a prison.

My first class as a substitute was in your home economics class. I worried about that. I was never the Future Homemakers of America type. I've only ever taken one semester of home economics myself, but I needed the pitiful money and so I went. Again, trends from 20 years before had intensified. Back then, educational officialdom steered the future house and farm wives of East Tennessee into home economics. And if they found any girls they simply had not a clue what to DO with, they steered them into home economics as well. The classes were an odd mix of the ridiculously perky and the chronically depressed.

In 1998, the teacher had left a note and a video to show each class. Easy enough, I thought, provided none of the students decide to enjoy a game of torment the sub. As you drooped your way into class, I observed that all of you were the chronically depressed type of home economics student. Not a one of you enjoyed clothes in fashion for teens, not one perky housewifely girl among you, not to mention that none of you were even trying for goth or rapper looks. It was terrifying to realize that perky housewifely girls had gone extinct without my noticing it. It was more terrifying to realize that here was an entire classroom of kids who weren't even trying to fit into any youth subculture.

You groaned when I told you we were going to watch a video and I didn't know why -- we used to prefer substitutes who showed movies – but I soon understood your dismay. The video was, as you later explained to me, a "relationship video." For those of you who weren't there, imagine the worst Oprah show in history, filmed in black and white, featuring no Oprah and no black people whatsoever, all condescending white lecturers, produced by the bureaucrat in charge of seeing to it that the young do not marry into spousal abuse, become a spousal abuser, a child abuser, or, most important of all, a parent in the first place. Generic white man and generic white woman droned on about all these things and more. How to recognize emotional abuse. How to be neither victim nor victimizer in this personal relationship situation or that.

The video was so vile that I gave up on it and watched you instead. Every last one of you slumped in your seats. Your expressions far beyond mere boredom, you had hollow eyes and slack looks of total defeat. My eyes were getting watery at the sight of you when one of the boys finally worked up enough self-respect to say some-

Continued on page 21

Environmental Sketches

The following 'sketches' are works by students in UT's environmental journalism course, taught by Dr. Mark Littmann. Each student was asked to write a short sketch about an environmental disaster, using descriptive language that paints a picture in the reader's mind.

Chocking heat

Kindle Rouse

In Beijing, the sun does not shine. Well, at least not in the way it would in, say, Florida or the Bahamas. Instead it floats shy in the sky, hidden behind layers of haze and smog. Beijing scorches at certain times of the year, so perhaps a little shade couldn't hurt. But somehow the heat is only magnified. It becomes choking. After three days of breathing the polluted air that is part and parcel of the city, a visitor's throat is sore and raw.

Outside of Beijing is one of China's treasures – the Great Wall. Along the way, trees and shrubbery are shrunken and bare as they line the roads and the Wall itself. No birds flit through the air. Visitors climb to the top of the Great Wall, wheezing for breath. Then they whip out their latest digital cameras and are disappointed with the result because the lenses can penetrate the relentless smog only a few hundred yards. This sickness floating above the wonders of China corrodes vision, history, and life with every moment that passes.

Hazardous nest

Morgan McCorkle

The bird was easily visible from its position just above head-height in the overgrown privet bushes. It was a robin, but instead of perching in the branches with a worm in its beak, it was hanging upside down. It was nesting season, yet this bird would not complete its nest. Instead of choosing twigs and leaves to fashion its treetop dwelling, the robin had stumbled upon an alternative material, one that resulted in no nest at all. A mass of plastic green mesh used for seeding lawns shrouded its decaying body.

The netting had entangled the robin in the unyielding plastic.

Landslides

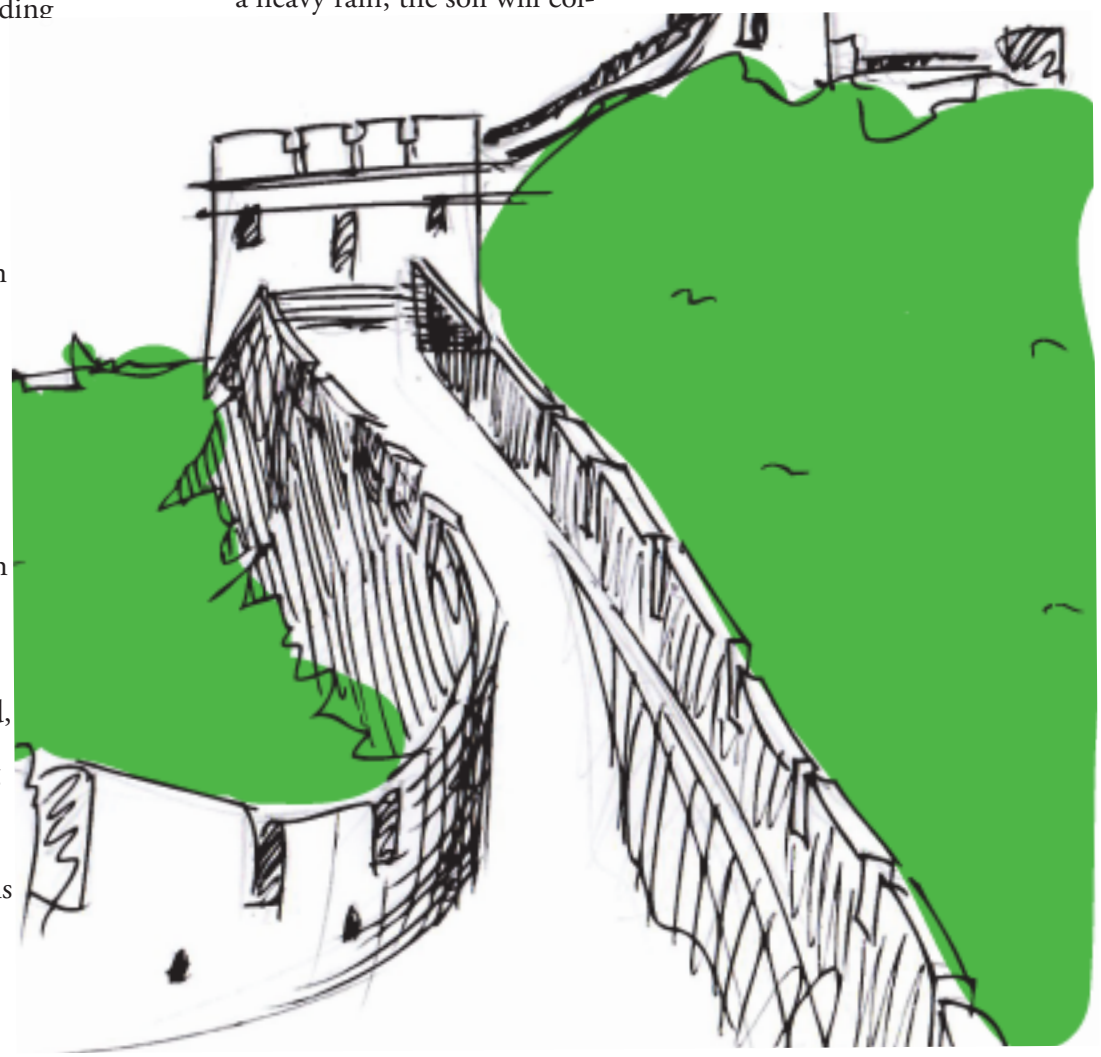
Chris Martin

At the summit of Sweat-Heifer Trail on the Appalachian Trail in southern East Tennessee, the sky is clear, the trees are thick and full, and the wind is cool. A hundred miles away, in the landslide at an abandoned strip-mine on High Point Mountain in northern East Tennessee, the air is stagnant, the vegetation is wilted, and the unstable earth is continuing to fracture.

The landslide began in 2005, swelling the streams of Scott County, Tennessee with run-off and sludge from the creek valley that was filled with coal slurry from blasting at the mine. The curvature of the landscape indicates where the stream once flowed, but now the watercourses are buried alive under tons of displaced earth and mine spoil in a scrambled mass.

The trees that had spread roots into the soil and held it against erosion and rainfall had been logged before the blasting even began, leaving the earth beneath unstable, whole clumps and boulders poised to dislodge after a single stormy night.

After a rain, the tracks of deer are visible in the muddy industrial trails, shallow hoof-prints in the rectangular tread gouges left by the haul-truck wheels. If the rain is light, the water will sit there, in scattered pools of deer tracks. The stagnant moisture never reaches the depths of the soil, only sustaining the root systems of the smallest shrubs. In a heavy rain, the soil will collapse with no network of roots to support it, and layer after layer of earth will be peeled away from the side of the hill, until it becomes the side of an artificial cliff. The only relic of a vibrant stream once a dozen feet wide is a thin trickle leaking from the lower end, suffocated beneath an overturned mountain of earth at the High Point Mountain landslide.



Endangered but not extinct

Knoxville Zoo provides hope for creatures large and small

Tameka Tift

On the walls of a small office hang pictures of popularly beloved mammals. Seated on the floor, a robust cage stands in front of a midsized window. Perched within the cage, a bright-green parakeet named Phil announces his presence. His bold song seems to shout, "I am here and my existence should be known."

Phil's screech drowns out the voice of his owner, Lisa New, director of Animal Collections for Mammals and Birds at the Knoxville Zoo. Phil, like all other animals in a given ecosystem, has the right to exist loudly and thrive.

This is also the case for 28 endangered species of bird, mammal and reptile inhabiting the Knoxville Zoological Gardens. Whether the consequences of human intrusion or by loss of habitat, species that range in size from the towering African elephant to the diminutive Burmese Star tortoise are experiencing dwindling populations.

One solution that attempts to offset these dangerously low population numbers lies in an accredited matchmaking program known as the Species Survival Plan or SSP.

The SSP, of which the Knoxville Zoo is a participant, began in 1981 and encourages sustainable populations by focusing on the preservation of pure genetic lineage or bloodlines.

"The SSP works on the population management of one species," said New. "This plan observes the demographics and genetics of a particular species as far back as 200 years. The goal is to minimize genetic diversity as well as maximize genetic health of a population."

Photo by Roxanna Shohadaee

This Burmese star tortoise (Geochelone platynota) is an AZA SSP species at the Knoxville Zoo.

How is this accomplished? It is not simply a matter of breeding the species with neighboring populations or next of kin to avoid inbreeding; the SSP researches the species' background data.

"A studbook contains genetic lineage," said New.

She compares the basis of the term 'studbook' to breed registry. This breed registry informs the zoo of when the animal came in from the wild and pinpoints the animal's relatives. All of this vital information is composed and then generated into a population matrix.

Zoos and aquariums must commit to the SSP program if they are to be accredited by the Association of Zoos and Aquariums (AZA). All participants have the goal of preservation in mind. To become accredited, zoos and aquariums must be evaluated and pass thorough examinations of treatment and care of animals and their facilities. Not every zoo and aquarium will qualify in North America, either by choice or by failure to abide by standards.

Once a zoo becomes officially accredited, the status ensures special care in transporting species and specimens to and from zoological locations.

Photo by Roxanna Shohadaee

Habitat loss is a contributing factor to the African lion's decline.

AZA zoos will not relocate any animal if it may jeopardize the welfare or health of that species. After successful relocation, the process begins to breed the species with the intent of generating pure breeds.

For instance, Baby George is the first chimpanzee in 20 years to be born at the Knoxville Zoological Gardens; the result of SSP breeding practices. The young primate celebrated his first birthday July 19th of this year. George's parents, Jimbo and Daisy, were bred to continue their bloodline to the next generation of chimps.

George is not the only baby who is an outcome of SSP. In another part of the zoological gardens, where the climate control is hot and humid, tortoise hatchlings explore their new home. The reptile territory is home to several other endangered species, including Burmese Star tortoises, which are listed as critically endangered on the International Union for Conservation of Nature (IUCN Red List of Threatened Species).

Bradley Moxley, herpetology keeper, explains the importance of the SSP.

"Underrepresented genetic material is important for repopulation," said Moxley.

A species population will survive if the gene pool has sufficient diversity. Accredited zoo efforts help combat and compensate for the losses of such dynamic animals in the wild.

"If ever these animals are to be released in the wild, [we are sure] that they will survive in the wild," said Moxley.

Zoo captivity of individuals could potentially be viewed as unjust and inhumane. However, zoos accredited by the AZA follow standards and goals that are ultimately designed to benefit a species' overall population. Having facilities that mimic a species natural habitat demonstrates a zoo's role as an agent for stabilizing populations. The security of captivity means a longer lifespan than the wild can sometimes offer. Threatened and endangered reptiles, mammals and birds, with the support of SSP-certified organizations like the Knoxville Zoo, can maintain their existence and regain viability in the ecosystem.

Tift is a sophomore in journalism at the University of Tennessee and can be reached at ttift@utk.edu.

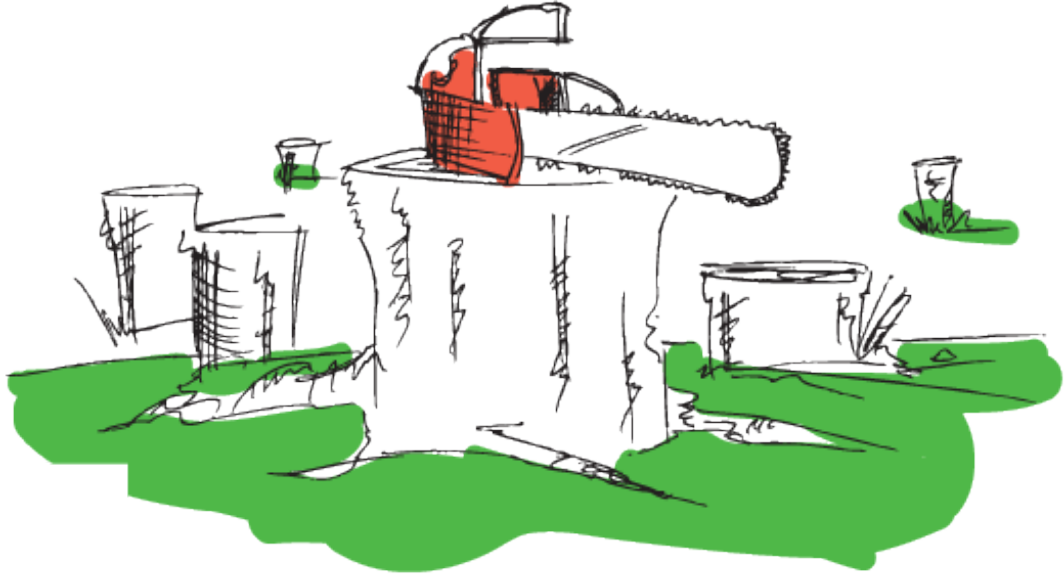
Litter

Stephanie Droste-Packham

At a speed of 70 miles per hour, the SUV whizzes by the speed limit sign that reads 55. The music is on; it is summer and hot in the afternoon sun. The SUV's backseat window eases itself down to about halfway and a to-go cup from a fast-food restaurant hurtles from the opening. It hits the pavement like a bomb, exploding with liquid. The lid ejects from its place atop the Styrofoam, still with the straw in its grasp.The cup dances along the baking asphalt until it settles in the middle of the lane. Another car, blind to its existence, kicks it up, reviving its dance. This time it bounces to the edge of the pavement and is blown over the side by the shock wave of another passing car. It rolls, gently and unnoticed, into a grassy ditch where runoff and wind quietly collect all the cups of yesterday.

Obed dump

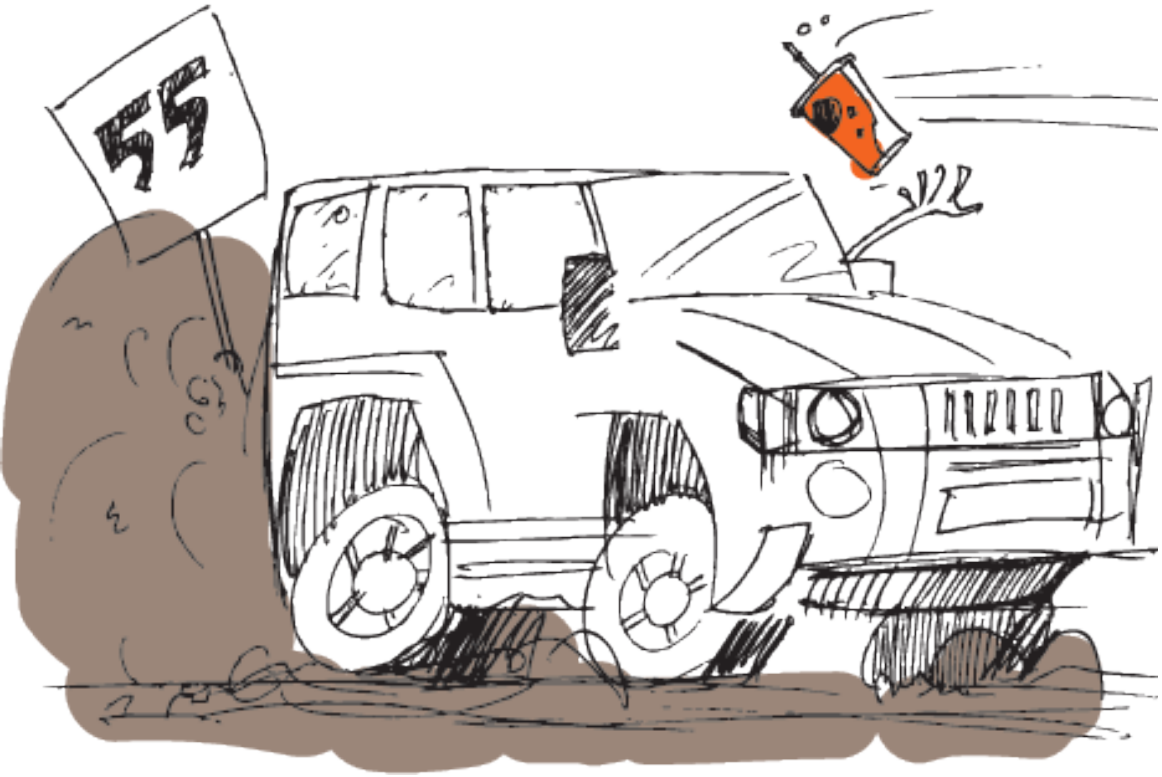
Rob Baldus



When visiting the Obed, one of America's few Wild and Scenic Rivers, you expect to find a pristine, immaculate national treasure. But that's not always the case.

The junction of the Obed and Emory rivers is peopled with squatters who use the shore as a summer getaway and dump. Shards of broken glass have replaced river stones. Deep puddles of mud now occupy the once abundant beds of cardinal flowers. And skinks, snakes, and spiders reside within the boxes and cans scattered about the ground.

Now that summer is coming to a close, the trash repository is going to be dealt with. The river will rise, and the refuse will become someone else's problem. The shoreline here will look pristine again, but of course, the tenants will be back next year.



Stumps with rings

Beth Storey

The pine trees that lined Stateline Road between Woodland Mills, Tenn., and Hickman, Ky., were the only decoration on the otherwise flat, barren strip of road surrounded by gently rolling, neatly planted wheat fields. Guardians of grinning opossums and glowering red-tailed hawks, these pines stood in the way of nothing. The occasional small brick house, barn, or double-wide trailer swam in the crop sea bordered by the trees. Folks living in the houses hardly noticed the pines in a place where nature thrived and asphalt was reserved for fancy driveways.

As the area became more and more settled with brick houses and fewer trailers and barns, someone decided these pine trees were in the way of something, but what still remains a mystery. The trees came down in a mass of green needles and scented bark, leaving only stumps with rings. The opossums scurried and the hawks soared and the two states melted together. Now passersby can enjoy the view of endless fields, overgrown yards, and rusty cars along Stateline Road.