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MODERN FAMILY

Age-old traditions are fading on the savannah

When you pay for a lunch or help a friend move, are you, in effect, buying insurance against a future need? Yes, if you are Maasai.

“We all form social networks, which serve various roles in our lives. The Maasai exemplify this,” said Assistant Professor Tim Baird in the Department of Geography, who has studied the African nomadic herders’ society for a decade. “They have endured a harsh environment for a long time by embracing each other and working as a group. In our own country, we often hear, ‘Do unto others as you’d have them do unto you.’ Maasai social networks often reflect these same values.”

Maasai livelihoods have traditionally been based on the seasonal movement of livestock through collectively held rangelands, which are managed by extensive social networks. These networks are built, in part, through longstanding patterns of social support, gift giving, and lending. Now, many factors are pushing the Maasai towards new economic activities and social arrangements, including biodiversity conservation.



The cellphone has gained a place on many Maasai belts, next to the sword.

The creation and expansion of national parks and protected areas throughout East Africa has led to important social and economic changes for residents nearby, according to studies by Baird and colleagues, who examine human-environment interactions near Tarangire National Park in northern Tanzania.

Alienated from parklands and worried about the further prospect of park expansion, many Maasai have adopted mono-crop agriculture to “protect” their land and supplement their income. “It is unfortunate that parks,

formed to protect wildlife and plant diversity, can encourage practices that fragment habitats, encroach on animal migration corridors, and reduce biodiversity,” Baird said.

“But parks also create opportunities,” he added.

Veterans of risk management, the Maasai have also adopted other livelihood activities, such as odd jobs in rural areas, land leasing, and wage labor in urban centers. And as they have



Maasai customs and traditions have withstood the test of time but may be threatened by technology.

broadened their sources of income, they have begun to exchange fewer gifts and loans.

“Lower levels of exchanges between households may represent a new normal,” Baird said. “The trend may be that as households diversify, they change the ways they use social networks and, ultimately, reduce their engagement with traditional networks altogether.”

Following up on an observation in 2010 about the numbers of households and individuals among the Maasai that were using cellphones, Baird returned to Tanzania in 2014 with funding from the National Geographic Committee for Research and Exploration to determine the impact of cellphones on social networks.

“I had this idea that phones are an important piece of what was going on, which is a transition from one type of network to another,” Baird said. “The new networks are less homogenous and seize on new opportunities to build bridges with different groups and access different types of information.”

Baird grew up in a small town where everyone knew and cared for each other. The close connections were



A group of young Maasai crowd around to look at photos of the day on a cellphone. Research is revealing how this traditional group is using phones to support their activities and develop new networks.

helpful, but there was little access to people outside of the community. “When I went to college, I met people from all over the world,” he recalled. “Those connections afforded me access to new ideas, new information, and new ambitions. I wondered if the people I study were going through this type of transformation. And if they were, I suspected that the phone is this incredible tool they were using to help with this transition.”

Baird surveyed households and interviewed groups of people in multiple communities that vary in terms of distance from the park boundary. In 2010, he observed that groups closer to the park were more economically diversified than distant groups. In addition, he observed that phones were common, but not universal, in each community and that households with phones had higher incomes than those without.

By 2014, the cellphone had become a critical tool, like the short sword, worn together on a Maasai man’s belt. “Even in 2010, the Maasai used their phones to support traditional herding,” Baird said. “For example, they call friends and relatives in other areas to locate forage and surface water.”

Now the Maasai use phones to warn of dangerous animals that may attack people, livestock, or farms. Phones also speed commerce. Men take photos of livestock and take the pictures to market, which saves having to move the animal. And the phone is used to gather information from more people.

However, new bridges to information may be weakening a more traditional network. “Nowadays, Maasi households don’t need to rely on their neighbors as often. They’re able to independently manage problems

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(Left) Assistant Professor Tim Baird has studied Maasai society for a decade.

Photo by Roger Phillips

(Right) Tim Baird interviews Maasai men about social networks and traditional gift giving.

Photo by Kiyah Duffey





We enter the fall semester with our largest class ever of new undergraduate students, which includes entering freshman and students transferring from other institutions. The college has met its in-state and out-of-state enrollment goals for fall 2016, and we are excited about the quality and diversity of our new students. Our undergraduate enrollment will continue to grow over the coming five years parallel to Virginia Tech's enrollment goals. We are fortunate to have the opportunity to grow not only in size but in relevance to the global challenges of the 21st century. I assure you we are committed to maintaining a quality experience, familial atmosphere, and personal attention to our students as we grow. An exciting horizon lies ahead.

Our faculty finished the fiscal year with the highest amount of research awards in the college's history, attracting over \$21 million in external support for their research programs. Much of this funding supports our graduate students. This level of external support is testament to the creativity, curiosity, intellect, hard work, and persistence of our faculty.

We completed a number of renovation projects over the summer months to create additional desk space and modernize several graduate student rooms and other offices. Quantity and quality of space remains our greatest challenge, and this scenario will become increasingly more evident as we continue to meet enrollment goals and hire additional faculty and staff.

Steve McMullin, professor of human dimensions of fisheries and wildlife, retired in June. Steve is the founding director of the college's Leadership Institute and has agreed to help with the 2016-17 cohort — our



Dean Paul Winistorfer (left) with Bill Carstensen, who recently stepped down as head of the Department of Geography after 10 years in that role.

seventh since the program's inception. Well done, Steve, and thanks. You will be missed.

Bill Carstensen has stepped down as head of the Department of Geography, returning to full-time teaching and research following 10 years of service to the department and college. It has been a pleasure to work with him in this leadership role, and he leaves the department in great shape. During the decade of Bill's leadership, we developed the new meteorology degree program, added a significant number of faculty, and saw undergraduate enrollment increase considerably. We will start a global search for a new department head in the fall. Thank you, Bill.

I am excited about our upcoming conference, Women in Natural Resources: Leading, Mentoring, and Connecting, taking place in October. We have put together an excellent program, and I hope you will consider joining us. See page 3 for more information.

We are moving closer to the 25th anniversary of the College of Natural Resources and Environment. Established in 1992, the college today is one of North America's leaders in education, research, and outreach in natural resources and the environment, and is ranked No. 1 nationally for the second consecutive year. With a strong foundation in forestry, wildlife, fisheries, and wood, and the addition of geography as well as the development of many new degree programs, the college is well positioned for the future. Watch for details on our celebration of this important milestone. I hope you can join us in Blacksburg for some of the events.

Fall semester is off and running, and we once again recall the excitement and anticipation we experienced as new students heading off to college. We welcome the exuberance of our new and returning students. Our future lies in them!

Warm regards from our faculty, staff, and students,

Paul M. Winistorfer
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CNRE Career Fair

Recruit future employees from the No. 1 ranked natural resources school in the USA! Attend the CNRE Career Fair on Sept. 29 from 10 a.m. to 4 p.m. Email cnrecareerfair@vt.edu or call 540-231-5482 for more information or to reserve a space.

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Age-old traditions (Continued from page 1)

such as illness in the household or poor maize yields because they have multiple sources of income. And I think cellphones are speeding this process of individualization."

As a result, the Maasai's ability — or, perhaps, their will — to respond to community problems, like managing communal grazing lands and protecting open areas, is being undermined, Baird said.

With cellphones, it is easier to announce a meeting, and it is easier to get to meetings with the dramatic increase of motorcycles in the area, but people often don't come, Baird was told. Or when they do, it is difficult to reach consensus.

"In the past, leaders would discuss whatever the topic was and make a decision, and everyone would fall in line behind the decision," Baird said. "Today there

is much more debate and it's much more difficult to agree on things."

The Maasai are gaining a sense of individual rights, which may be undermining their obligations to each other. "Like groups everywhere, including our own communities, the Maasai are adjusting to and in some ways shaping the modern world," Baird said. "Some individuals long for the past while others pine for the future. I believe that this tension is strongly affecting the ways they relate to each other and solve problems, and the environment in which they live. Their struggles and innovations reflect our own — and we have much to learn from their resilient and adaptive spirit."

Read more about Tim Baird's research at tbaird007.wordpress.com.



Old meets new in a Maasai village, where a solar panel delivers electricity to a traditional hut.

CNRE NEWS
COLLEGE OF
NATURAL RESOURCES
AND ENVIRONMENT
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Summer 2016 Quarterly Newsmagazine

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Top cover photo by Dean Paul Winistorfer
Printer **Progress Printing of Lynchburg, Va.**



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Registration now open!

The college is hosting a conference to highlight the role of women in natural resources for the benefit of faculty, staff, students, alumni, and colleagues. "Women in Natural Resources: Leading, Mentoring, and Connecting," scheduled for Oct. 27-28 at the Inn at Virginia Tech, will include presentations, breakout sessions, activities, and opportunities for networking.

We are pleased to host Carolyn Finney, a writer, performer, and cultural geographer, as our keynote speaker. A geography professor at the University of Kentucky, she is deeply interested in issues related to identity, difference, creativity, and resilience. In particular, she explores how issues of difference impact participation in decision-making processes designed to address environmental issues.



Photo by Lynnly Laboritz

Carolyn Finney

Don't miss out on this exciting event. Visit cnre.vt.edu/womensconf for registration and conference details.

Women in Natural Resources

Leading, Mentoring, and Connecting

Redesigned website highlights Virginia's largest trees

The state's big trees might seem even a little "bigger" on the Virginia Big Tree Program's newly redesigned website (bigtree.cnre.vt.edu). "We hope this redesign will encourage even more individuals to use the website," said Associate Professor Eric Wiseman, who serves as program coordinator. "We aimed for a simpler, intuitive layout that will be easier to use on mobile devices."

Virginia's big trees are those that are the largest of their species, measured by height, trunk circumference, and crown spread. The website lists the five largest trees of more than 300 species and includes photographs of the honored trees as well as their location, the names of the individuals who nominated them, and other details.

Some travelers and tourists plan their vacations around champion trees. "Many individuals seek out the trees as a hobby and have a bit of a competitive spirit when it comes to discovering champion trees," Wiseman said. Community and civic groups often mark champion trees with signs and special fences to help visitors find them and to protect the trees. "We hope the website will encourage everyone to appreciate and protect these special trees."



The Virginia Big Tree Program has redesigned its website to make it easier for visitors to visit and learn about the state's champion trees.

Awards and Honors

The college honored some of its most accomplished students, prominent alumni, respected faculty, and cherished friends at this year's Annual Awards Recognition Celebration. View the complete list of 2015-16 awards and recipients at cnre.vt.edu/events/awards-recognition-celebration/2016-awards-recognition-celebration-program.pdf. Among the many honors presented are those highlighted here.

Outstanding recent alumnus



Kathryn Procriv ('11 B.A., '12 M.S. geography) received this year's **Outstanding Recent Alumni Award – Graduate Degree** in recognition of her early career accomplishments.

Procriv, a weather producer for The Weather Channel in Atlanta, helps to produce the daily morning show AMHQ with Sam Champion, using her background in geographic information

systems, cartography, and weather graphics to tell the story of the day's weather. Hired full-time after only four months freelancing for the channel, she is responsible for AMHQ's behind-the-scenes operations. Despite a fast-paced, often hectic work environment, Procriv loves her job. "Our main mission is to save lives," she explained. "Giving people the information they need to stay safe and live their lives is the best part."

In addition to her work with The Weather Channel, Procriv has remained an integral part of the Virginia Tech community, using her position to promote the meteorology program whenever possible, and even inviting meteorologist Jim Cantore to visit "The Cube," a black box theater in Virginia Tech's Moss Arts Center where students and researchers can walk through a virtual storm.

Most recently, Procriv took vacation days to help her mentor, meteorology instructor David Carroll, lead a team of Hokie Storm Chasers. "I asked all the students to send their pictures so I can put them out there on The Weather Channel," she said. "I'm doing everything possible to get the meteorology program on the map and to get everyone's hard work recognized. The fact I earned this award for outreach means that I'm giving back to the department that's done so much for me."

Outstanding graduates



Graduating senior: Natalee Yates

Hometown: Luray, Virginia

Majors: Wildlife conservation

Main accomplishment: Getting involved with the U.S. Fish and Wildlife Service early in my college experience provided me with many opportunities and experiences. I was able to travel the country and work in National Wildlife Refuges in Mississippi, Minnesota, Florida, and South Dakota. I learned not only how wildlife differs across the country, but also different management styles, field techniques, and the variety of challenges that face wildlife professionals. I look forward to continuing my time with the U.S. Fish and Wildlife Service and learning more about the field of wildlife conservation.



Master's Student: Brian Parkhurst

Hometown: Blacksburg, Virginia

Major: Forestry

Research focus: My master's research focused on the changes in forest soils associated with mechanical harvest operations. Conventional harvesting methods include the operation of heavy equipment, which can change the characteristics of forest soils, sometimes leading to changes in stand and site quality. Virginia Tech partnered with the U.S. Forest Service to create a test course associated with an active timber harvest. The course was used to compare a rubber-tired skidder to a tracked skidder and to test a new method of quantifying changes in soils using buried water-filled bulbs and pressure transducers. These sensors can be thought of measuring the "elasticity" of the soil; readings were compared with conventional soil measures to look for relationships. Traffic level, machine type, and ground cover type were also investigated. The sensors will be used in future research projects to aid in quantifying changes in forest soils.



Doctoral Student: Lindsey Rich

Hometown: Evergreen, Colorado

Major: Wildlife conservation

Research focus: My dissertation research evaluated the densities, distributions, and ecology of wildlife communities in northern Botswana, with a focus on carnivores. My field research entailed a multi-year camera trap survey in which I deployed 220 camera stations across a 1,000-square-kilometer area. I used the 16,000 photographic detections of mammals to estimate seasonal densities of seven carnivore species and distributions of 44 mammal species as well as to understand how environmental features and anthropogenic pressures are impacting wildlife communities. This research advances the field of population modeling by using a single survey to simultaneously assess multiple species, as compared to single species, and will help inform land use and land management policies in Botswana.

Partnership with Blacksburg Children's Museum showcases geospatial technology, weather

Visitors to the Blacksburg Children's Museum now have a view of where they are in space and time thanks to an interactive geospatial exhibit with a wall-sized satellite image of the region and historical images of past decades. The new exhibit also includes a weather station displaying current and past weather conditions. "This is our first exhibit that directly addresses our region with geography and weather," said Museum Director Julene Rice. "It's amazing."

Professors Jim Campbell and John McGee, and doctoral student Tammy Parece created the exhibit with support from VirginiaView, an outreach program. "We have been taking geospatial technology exhibits to events and schools for years," Campbell said. "We have a display with imagery, maps, and computers that offers interactive local scenes."

McGee added, "We used images from Landsat, which is a series of U.S. scientific satellites that have been imaging the Earth's surface for 40 years. The exhibit also builds on the online digital atlas of Virginia, which we developed to support Virginia's educational community."

When museum volunteer and board member Treesha Baird saw the exhibit at the 2014 Science Festival and the way it engaged children and their parents, she asked if the team could create a permanent display for the museum. "I realized there was a unique



Jim Campbell (left) and John McGee introduce museum visitors to Southwest Virginia as recorded by aerial photography.

Professor Robert Oliver secured funding for the lesson plans and teacher training.

The weather station was supported by a donation from Draper Aden Associates. Lucas Looney, a senior geography major, guided museum visitors as they learned about the images and weather technology as part of a service-learning project. "Weather grabs kids' attention like you wouldn't believe," Parece said. "And it is a way to interest kids in science."

"The goal is for kids to understand map imagery and relate it to their lives," Campbell explained. "This develops into understanding concepts of scale, how people use the landscape, and an understanding of their region."

opportunity to involve the university with the community, to offer a resource not only for museum members but for teachers," she said.

VirginiaView funded the 15- by 10-foot mural of a Landsat satellite image of Southwest Virginia and the 10-foot square carpet that shows most of the state. Katie Britt, a doctoral student in geospatial environmental analysis, designed the mural using remote sensing processing and image enhancement techniques.

New light tables provided by the Virginia Association for Mapping and Land Information Systems allow children to examine and mark smaller paper images of the region. Teachers can borrow the tables and images to use with lesson plans being developed by the VirginiaView team and the Virginia Geographic Alliance, from which Assistant

Congressman Morgan Griffith visits Research Aviary



Doctoral wildlife student Sydney Hope (right) explains her research on wood duck behaviors to Virginia Congressman Morgan Griffith.

Prompted by his longtime interest in birds, Congressman Morgan Griffith visited the college's new aviary in May to learn about its research. The aviary, which opened in fall 2015, is one of few such university facilities in the region and is used by researchers across campus who need controlled space for studies.

An avid international birder, Griffith recently introduced legislation requiring new federal buildings to include bird-safe building materials and design features to the maximum extent possible. It also requires the use of similar measures on existing federal buildings when the buildings are being substantially renovated.

At the aviary, doctoral student Sydney Hope showed Griffith wood ducks that were hatched out of incubators

and explained how she is examining the effects of varying temperatures on the early development of bird behaviors that are ultimately important to early survival. She showed Griffith the exploratory arena she created to study the social behavior of wood ducks. Hope's research examines how bold and exploratory the ducks are.

Griffith said he tries to plan his vacations around worldwide bird watching. "When I go into a new area, I find it helpful to meet up with a local birder who can show me the hot spots. With our region now marketing itself as an outdoor destination, I hope Virginia Tech can help get a system whereby visiting birders can easily connect with local bird guides to see what we have."

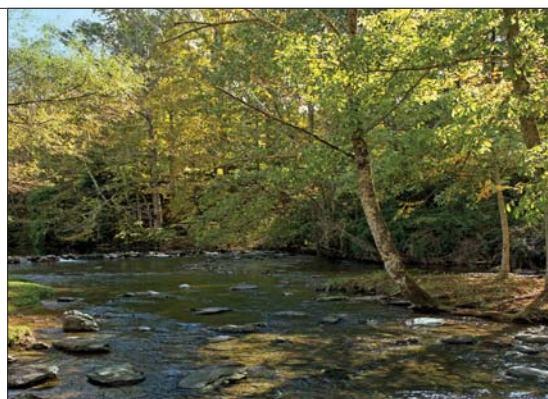
Protecting America's water supply with forestry best management practices

America's 700 million acres of forest filter two-thirds of the country's water supply, but logging and other activities can spill debris into waterways. Forestry faculty Mike Aust, Chad Bolding, Scott Barrett, and John Munsell completed a two-year investigation into the protocols state forestry agencies use to safeguard water.

Forestry activity triggers only a small percentage of water quality problems, but erosion from poorly designed or maintained forest roads and logging trails can increase sediment in nearby streams. Forestry professionals have developed water quality protection measures known as forestry best management practices (BMPs) to protect waterways. Originally developed in the 1950s, BMPs are periodically updated as technology changes and research identifies better methods.

BMPs and adherence protocol vary by state, but common measures dictate how to locate, construct, and maintain routes and work sites to minimize erosion. The federal government continues to update water quality standards, and state agencies keep pace by refining their BMPs. "With every update of the Clean Water Act, states have responded by developing new BMPs or improving older ones," Aust explained. "Therefore, it is important that states share information regarding the use and effectiveness of forestry BMPs as they are currently applied, with the goal of improving identified problem areas."

To help the states make informed decisions, the National Association of State Foresters (NASF) commissioned the Virginia Tech researchers to evaluate BMPs across the



Forestry best management practices have been proven to protect water sources.

country. Aided by graduate student Richard Cristan, the team developed a survey for state forestry agencies. The questionnaire provides the most comprehensive review of state BMP programs.

All 50 states and one territory responded, reporting more than 90 percent compliance with BMPs overall. No significant differences in compliance were identified between states that use a regulatory approach or a voluntary approach. The survey clearly indicated that forestry BMPs are in wide use to protect water quality but also identified several areas where BMP usage still needs to be improved, typically forest roads, skid trails, and stream crossings.

The NASF uploaded the team's findings as part of an interactive online map (visit stateforesters.org). Users can select a state and learn which standards apply there and whether its program is regulatory, quasi-regulatory, or voluntary. "The goal was to put the research into a database where the state foresters or other interested people could examine the forestry water quality protection measures for any particular state," Aust noted.

Cantore returns!

Jim Cantore of The Weather Channel made his second trip to the Cube at the Moss Arts Center, where he previously "walked" through a tornado in 3-D, re-created by a team of meteorology faculty and students. During his latest visit he viewed the landfall of Hurricane Charley in south Florida and the 2013 El Reno, Oklahoma, tornado, in which the movement of the tornado was animated across a series of 12 radar sweeps. While on campus, Cantore also returned to the Virginia Tech Wind Tunnel facility. Several meteorology students were on hand to see him endure a speed of 186.9 mph, the equivalent of a category 5 hurricane or an EF4 tornado, shattering his previous record of 158.6 mph. Watch his



experience, which aired on The Weather Channel, at youtube.com/watch?v=fn31Mfcb5KY.

Jim Cantore in the wind tunnel and with meteorology students (L-R) Jessica Suggs, Erin Guidry, and Peter Forister.



No geographical boundaries for online natural resources program

Working toward a master's degree in natural resources has been part of **Lowaeli Damalu's** life for the past six years and her dream for even longer. On May 15, she attended the Virginia Tech National Capital Region Commencement to receive her degree, having traveled more than 7,600 miles from Tanzania to attend.

Damalu is the first woman to head Tanzania's Pasiansi Wildlife Training Institute, responsible for training wildlife and park rangers in law enforcement and sustainable wildlife management since it was established in 1966. Actively engaged as a wildlife conservationist for 25 years, Damalu has held a number of senior-level positions in Tanzania's government, including overseeing efforts to combat poaching and wildlife trafficking.

Since she was in high school, Damalu knew she wanted to pursue a master's degree. Higher education in Africa is limited but is essential to contributing to positive growth and development. She also knew she would like to obtain her degree from a well-regarded university in the U.S., but there were obstacles, including the cost as well as professional and family obligations that would not accommodate her leaving Tanzania. The college's online master of natural resources program, one of

several offered by the Center for Leadership in Global Sustainability (CLiGS), provided an ideal solution.

CLiGS faculty member Heather E. Eves met Damalu eight years ago when working with Nancy Gelman, program officer for Wildlife Without Borders at the U.S. Fish and Wildlife Service, to identify fellows for its inaugural mentoring program. "Nancy and I were immediately



Lowaeli Damalu (center) with her mentors Nancy Gelman (right) of the U.S. Fish and Wildlife Service and Heather Eves, faculty member at the college's Center for Leadership in Global Sustainability.

impressed by Lowaeli and we continue to be," said Eves, who served as Damalu's advisor. "We know how hard she works and how well-respected she is in her profession for her leadership, integrity, and efforts on behalf of African wildlife conservation."

Taking online courses in Tanzania was not without technical challenges. Internet service is unreliable and, "I had to work hard to improve my personal computer skills to be able to navigate through websites and email programs that were essential for online study," Damalu said.

Eves said she never doubted that Damalu would complete the program. She hosted Damalu during her weeklong American stay, accompanying her on visits to both the National Capital Region and Blacksburg campuses as well as Shenandoah National Park. Damalu was overwhelmed at all the trees she saw along the way, marveling at how much natural forest remains in such a "developed" country.

Damalu is very grateful to the Virginia Tech faculty and staff who were committed to helping her achieve her dream. "I've been saving up for a long time to make this trip and attend commencement, and I wouldn't have missed it. I am so proud to be among the Virginia Tech students who received graduate degrees," she said.

Students dominate outdoor writing and photo contest

Students in the college continue to uphold the university's tradition of success in the annual VOWA (Virginia Outdoor Writers Association)/Dominion Resources annual Collegiate Undergraduate Writing and Photo Contest, taking home eight of 12 awards in the 2015-16 competition.

Deirdre Conroy of Falls Church, Virginia, a freshman double majoring in wildlife conservation and in literature and language, won the VOWA/Cooperative Living Magazine Collegiate Award for the best entry relating specifically to Virginia. Her richly descriptive essay, "That Old Mountain," recounts hiking Old Rag Mountain and the beautiful vistas of the Shenandoah Valley. "I wanted my first writing contest to be related to something I'm interested in, as I love outdoor recreation as well as my field of study, wildlife conservation," Conroy said.

Freshman forestry major **Niall Goard of Chesapeake, Virginia**, won the VOWA/Hunt's Best Collegiate Outdoor Photo Award. His stunning image, "McAfee Knob at Sunset," captured the knob, the stars above, and the distant lights of Roanoke, highlighted with a green tent lit from within by flashlight. "The college has definitely opened my eyes to many conservation issues, which really fueled my passion for photography. I've found a new drive to capture the great outdoors to inspire others so that we can all respectfully enjoy nature without destroying it," Goard said.



Niall Goard earned first place for his image, "McAfee Knob at Sunset."

Lynn Wormeli of Herndon, Virginia, a senior majoring in geography with a minor in religion, was runner up in the VOWA/Dominion Resources Collegiate Undergraduate Award for Best Overall Essay for "Countering Insanity," inspired by her experiences as a camp counselor.

Lauren Bowman of Dublin, Virginia, a senior majoring in wildlife conservation, earned honorable mention in the VOWA/Dominion Resources Collegiate Undergraduate Award for Best Outdoor Essay for "The Kayak," describing a visit to a chain of barrier islands off the coast of Florida.

Jessica York of Hampton, Virginia, a junior wildlife conservation major, earned first honorable mention in the VOWA/Cooperative Living Magazine Collegiate Award for her essay, "Alone in Nature," in which she writes about an experience hiking to the Cascades waterfall near Blacksburg.

Melissa Skirkanich of Leesburg, Virginia, a junior double majoring in wildlife conservation and multimedia journalism, took second honorable mention in the VOWA/Cooperative Living Magazine Collegiate Award for her essay, "The Mountain Man," recounting a sunrise climb to McAfee Knob.

Christopher "C.A.M." Gerlach of Alexandria, Virginia, a junior double majoring in meteorology and geography, earned honorable mention in VOWA/Hunt's Best

Collegiate Outdoor Photo category for his image of a hawk captured at sunset in his own backyard.

Christina Nelson of Purcellville, Virginia, a sophomore wildlife conservation major, earned honorable mention in the photo category for her image of a falconer and his eagle.

See all of the winning essays and photos at cnre.vt.edu/students/current/vowa-writing-contest.

Mitcham inducted into Keystone Fellows



Maddie Mitcham of Virginia Beach, a sophomore double majoring in geography and international studies, has been inducted into the inaugural cohort of Keystone Fellows. The organization recognizes Virginia Tech students who embody the Aspirations for Student Learning and personify a commitment to learning, self-improvement, and a desire to better the world around them.

Mitcham, a member of the Virginia Tech Corps of Cadets and a class of 2018 officer, was recognized along with

14 of her peers for the impact she is making at Virginia Tech and beyond. She is a part of the Esprit de Corps, a team of cadets whose goal is to ignite excitement during football games. As a class officer, she works behind the scenes, designing the class ring and organizing the ring dance. She also serves as an orientation leader and a Hokie Camp counselor. Off campus, she volunteers with Operation Smile, an international charity that provides surgeries for children born with cleft lip or cleft palate.

For Mitcham, service to Virginia Tech and her community is second nature. Her "This I Believe" statement, required in her Keystone Fellows application packet, explained her firm belief that "little things can have a big impact" and that everyone should do the most that they can for others, regardless of the resources they have available.

Mitcham plans to continue her tradition of service by commissioning into the U.S. Army upon graduating. She credits her educational and extracurricular opportunities at Virginia Tech with shaping her commitment to service, noting, "without Virginia Tech, I might not have grown to be who I am today."

Cadet highlights colors at Miami game

In a continuing partnership between the Virginia Tech football team and the Corps of Cadets, players and cadets are selected to highlight the colors — the American flag, the state flag, and the team's spirit flag — during the pre-game ceremonies at each game. Three freshmen cadets are selected for

home games, while one or two upper-class cadets travel with the team to away games. Based on his outstanding performance, **Cadet Randall Rechkemmer of Virginia Beach**, a senior majoring in meteorology, was selected for this honor and traveled with the team to the University of Miami game last October. Rechkemmer, from Charlie Company in First Battalion, is a member of Air Force ROTC and a recipient of the Wesley L. Baum '48 Emerging Leader Scholarship.



Research is a critical component of the college's mission of Advancing the Science of Sustainability. The short summaries below provide a glimpse into the wealth of research for environmental sustainability being conducted by our world-class faculty members. Visit vtnews.vt.edu/feeds/natural-resources.html to read the full stories behind these summaries as well as other press releases pertaining to the college.

Project examines land management practices and climate change



One component of the study is to better understand how forest management influences climate, including cloud cover.

A new project will help scientists to look many decades ahead and predict the effectiveness of land management practices to mitigate climate change. "Our aim is to study how agricultural and forestry practices that provide food and timber can alter climate by modifying the energy, water, and greenhouse gases in the atmosphere," said Assistant Professor Quinn Thomas, who is leading the \$2.6 million, five-year project funded by USDA's National Institute of Food and Agriculture.

Uncertainty in climate prediction can be substantial when considering the chaotic nature of the atmosphere and the challenges of predicting future human behavior, as well as the influence of land-use and land-cover change on carbon and energy cycles. The project will use field data to better understand key ecological processes and integrate these findings into a state-of-the-art Earth system model that contributes to the goals of the Intergovernmental Panel on Climate Change. Project partners include Professor Thomas Fox, University Distinguished Professor Harold Burkhart, and forestry doctoral student Benjamin Ahlswede from Virginia Tech as well as colleagues from Cornell University, Purdue University, and the University of New Hampshire.

Limited water resources may pose threats to wildlife and humans in dryland Africa



Ensuring that sufficient water access is maintained for water-dependent wildlife may be not only a conservation goal but a human health priority.

In sensitive dryland regions where surface water resources are scarce, limiting the access of elephants and other wildlife to water through human development can impact water quality and, potentially, human health, researchers report in the journal PLOS ONE. "Loss of habitat and limitation of wildlife access to rivers and floodplains in water-restricted regions may increase the impact of species on surface water resources," said doctoral student J. Tyler Fox.

Fox and Professor Kathleen Alexander evaluated water quality dynamics over a three-year period in the Chobe River in Northern Botswana, reporting that significant relationships were found in the dry season between increased concentrations of *Escherichia coli*, flood plain habitat, protected land use, and fecal counts from elephants and other wildlife along the banks of the river. In contrast to the dry season, wet season *E. coli* was only associated with suspended solid matter in the water, suggesting storm water and sediment runoff may significantly influence *E. coli* loads during that season.

Availability and access to surface water resources should be considered a priority in the design and ensure available surface water resources are able to sustainably support both human and animal needs, they concluded. "Our findings have important implications to land-use planning in southern Africa's dryland river ecosystems," Alexander said.

Researchers help design incentive programs to rid South America of invasive beaver

North American beavers have wiped out 30 percent of forests along rivers and streams in Tierra del Fuego, at the southern tip of South America, causing the greatest landscape change to these fragile forests in the last 10,000 years. The governments of Chile and Argentina want the invasive beavers gone, but eradicating them has proven to be difficult, a research team found, because it requires the participation of every single landowner in the area. "Payment programs help, but getting all landowners on board is the crux of this and many other invasive species eradication programs around the world," Assistant Professor Michael Sorice, a co-author, said.



Beaver imported decades ago to Tierra del Fuego in South America from North America now number over 100,00 and are causing significant ecological damage.

Photo courtesy of Anna Santo

The team's research, published in *Global Environmental Change*, shows that landowners were willing to participate in a beaver removal program. "Landowners preferred a

program that would allow the program managers to have access and complete control over beaver eradication on private land," said forestry master's student Anna Santo, lead author. The study's unexpected finding that landowners prefer a program that takes more control over beaver eradication on their land may be a result of economic setbacks (such as the decreased demand for Patagonian timber), tax increases, depredation of livestock by wild dogs, and a shortage of skilled ranch labor.

In 1946, the Argentine government introduced 20 North American beaver to create a fur industry; the mammals have expanded into Chile and now number over 100,000. The two nations have signed a binational treaty to eradicate the species before its ecological impacts spread further, to the mainland and throughout the archipelago.

Community livelihoods depend upon accurate wildlife estimates

Evidence of wildlife passage, such as tracks, scat, fur, and disturbed surroundings, is a more accurate tool for assessing wildlife conservation status than actual encounters with animals, according to an international team of scientists. "Being too conservative, such as prohibiting hunting of a game species because there are few sightings, can be unnecessarily hard on communities that depend upon game for livelihoods and food security," said Senior Research Associate Kirsten Silvius, a member of the team that spent three years in the Amazon



comparing sign-based and encounter-based methods to estimate hunted wildlife populations. Their results were published in PLOS ONE.

Both animal sign (tracks, feces, hair, etc.) and direct encounter data were collected. Several hundred hunted and un-hunted species were detected using both methods, but the researchers found that the most important game animals, such as tapirs and the hog-like peccary, were significantly under-detected by the encounter method, likely as a result of behavior changes in response to being hunted. Sign-based methods proved more reliable.

"These animals are important to food security and still hunted successfully," Silvius said. "Because the encounter-based method is considered the gold-standard for density estimations, the absence of sightings of tapirs near two villages would have resulted in a conclusion of tapir extinction, yet sign evidence was plentiful and kill rates were no different from those at villages where tapirs were visible." Sustainable logging in a multiple-use protected area could also have been curtailed based on the low visual encounters of tapirs, resulting in unnecessary restrictions on sustainable forestry activities.

Peccaries were among the species studied.

Surveys based on sign are an efficient tool because data can be continually collected and provide information on changes of numbers and location over time and in response to management strategies, the researchers report. Silvius emphasizes that sign data can be locally collected and interpreted as the basis for rapid, community-based decision-making and management.

Hokie Nation Network

Hokie Nation Network, a portal for alumni interested in professional networking opportunities, leverages social media, job listings, and other career resources designed to help Hokies connect with fellow alumni. Visit alumni.vt.edu/hnn to start networking today!

ALUMNI CORNER

TERESA MARTINEZ

A lot of hard work and a little trail magic

Though tales of “magic” and “angels” abound on our national scenic trails, the real magic is in alumna **Teresa Martinez’s** hard work and dedication to preserving these natural areas.

Martinez ('92 B.S., '98 M.S. fisheries and wildlife conservation), co-founder and executive director of the Continental Divide Trail Coalition, credits Virginia Tech and the college with establishing her love of the national trails as well as teaching her the science of caring for them. “But yes, ‘magic’ and ‘angels’ are part of the mystique and the lore,” she said.

She learned about national trails from the bottom up. As a freshman, she joined Virginia Tech’s Outing Club and was soon sawing, chopping, and hauling as a member of the crew that did the demanding maintenance of the Appalachian Trail. She moved up administratively within the club, from heaving a specialized hand tool called a pulaski to leading a trail crew and serving as club president.

“I was inspired, learned to think out of the box, and developed critical thinking skills at Virginia Tech,” Martinez recalled. “I got access and exposure to the science of forestry, wildlife, people, and land management.”

In her first job after earning her bachelor’s, as assistant regional representative at the Appalachian Trail Conservancy Southwest and Central Virginia Regional Office, she realized a need to understand why individuals volunteer. So she returned to Virginia Tech to learn more.

“Associate Professor Steve McMullin introduced me to the human dimension of natural resources,” she said of her advisor who chaired the committee for her master’s thesis on volunteerism in natural resource nonprofit organizations.

After 15 years with the Appalachian Trail Conservancy, Martinez headed west in 2007 and joined the



Continental Divide Trail Alliance. Unfortunately, the organization closed in 2012 owing to financial conditions, leaving the trail without a nonprofit partner working on its behalf.

“Knowing that we couldn’t let trail support efforts fail on our watch, three colleagues and I founded the Continental Divide Trail Coalition,” she explained. The organization is the lead national partner with the U.S. Forest Service, National Park Service, and Bureau of Land Management in the stewardship, protection, and administration of the 3,100-mile Continental Divide National Scenic Trail. “The coalition started with a \$4 donation in 2013 and now has over a quarter-of-a-million-dollar annual budget,” she said.

“My work now is organizational,” she continued. “Today — a strategic planning call, tomorrow — travel to New Mexico to meet with community members at one of the 600 small gateway communities we work with, next week — a meeting with congressional representatives.”

Her efforts have not gone unnoticed. Backpacker Magazine named Martinez a Trail Hero in 2013. She serves on the board of the Partnership of the National Trail System, a group that supports the management and administration of all 30 National Historic and Scenic Trails. The Secretary of Agriculture appointed her to the Pacific Northwest National Scenic Trail Advisory Council, of which she serves as chair. And last year, she was awarded the lifetime achievement award from the Partnership of the National Trail System in recognition of 25 years of service to the entire National Trails System.

Martinez acknowledges that the Virginia Tech motto *Ut Prosim* (That I May Serve) has been a guiding principle in all her work since that first day on the trail.



Austen receives Cross Alumni Leadership Award

Douglas J. Austen ('84 M.S. fisheries and wildlife conservation), executive director of the American Fisheries Society, received the Gerald H. Cross Alumni Leadership Award from the Department of Fish and Wildlife Conservation and the college’s Leadership Institute.

A native of suburban Chicago, Austen discovered his love of fishing as a child and pointed to family vacations spent on lakes or with access to nearby trout streams as the start of his career in fisheries. During his time at Virginia Tech, he worked closely with Professor Donald Orth on a project on the New River addressing smallmouth bass and helped to create computer programs to generate population estimates for use in the classroom.



Austen went on to serve as a fisheries researcher with the Illinois Department of Conservation and spent six years as the director of the Pennsylvania Fish and Boat Commission. In 2010, he became the national coordinator of the Landscape Conservation Cooperative with the U.S. Fish and Wildlife Service, where he served until he joined the American Fisheries Society in 2013.

Austen now works with staff and partners to ensure that fisheries science is used in policy development and legislation. He says the best part of his current position is the opportunity to work directly with the society’s members. “I get to help talented people flourish in their careers.”

Professor Emeritus Gerald H. Cross, head of what was then called the Department of Fisheries and Wildlife Sciences from 1976 to 1989, created a continuing education program focusing on leadership development for Forest Service professionals. Approximately 1,000 natural resource professionals have participated in the program since 1988. The leadership that Cross demonstrated inspired the creation of his namesake award, whose recipients are recognized for their dedication and outstanding achievements in leading others.

DONOR PROFILE

Good stewardship is good business



Brent Keefe ('87 B.S., '88 M.S. forestry) has devoted himself to the belief that good stewardship of resources is good business. While the endless meetings, phone calls, and emails he faces as president of the Hancock Timber Resource Group may seem boring to some, Keefe sees them as an opportunity to help his employees and investors connect with sustainable resource management on a personal level.

Hancock Timber, the largest timberland investment management firm in the world, provides an opportunity for investors to diversify their portfolios by helping them purchase and maintain large-scale forests. The company manages the operations of these forests on behalf of its investors and is currently responsible for 6.1 million acres of forest throughout six countries.

For Keefe, true success is measured on a slightly smaller scale. His favorite days are spent not in an office but in the field, meeting face to face

with his employees and investors. “I can talk with potential investors in the office all day long about sustainable resource management,” Keefe noted, “but when I take them into the forest to really show them how we manage resources, they make a connection and become excited.”

Keefe’s commitment to helping others understand the importance of resource management extends past his business life, however. A longtime supporter of the College of Natural Resources and Environment, Keefe donates to the college annually and established a scholarship in 2012 awarded each year to an undergraduate student committed to making a difference in the field of natural resources.

Citing a longtime love of learning as his inspiration for giving, he said, “**I want to see people connect with natural resources and understand the potential for managing those resources sustainably.**”

“Virginia Tech is a special place for me,” explained Keefe, who serves on the Department of Forest Resources and Environmental Conservation Advisory Board, dedicated to supporting the continued success of the department’s programs. Starting shortly after graduation with small donations, Keefe has been able to gradually increase his support of the college over the years and sees his donations as an opportunity to educate others and make a difference in the way natural resources are managed by future generations. “It doesn’t matter what amount you give,” he said. “Once you start, you find it becomes incredibly rewarding.”



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Save the date!

This year’s CNRE homecoming will take place when Virginia Tech defends the Commonwealth Cup against the University of Virginia to close out the 2016 regular season. Mark your calendar for homecoming events on Nov. 26 and visit alumni.vt.edu/reunion for updates.

High-tech forestry research flourishes in rural Virginia

High-tech research on forests, nestled in a pastoral setting, offering outreach to citizens – the Reynolds Homestead has it all.

Located in Critz, Virginia, just above the North Carolina line, the homestead site is a Commonwealth Campus Center of Virginia Tech consisting of several components. The restored historic home, the birthplace of tobacco manufacturer R.J. Reynolds, is designated a State and National Historic Landmark and listed on the National Registry of American Homes. The site's Community Enrichment Center offers a wealth of art, music, and entertainment programs for all ages.

But the vast majority of the site's 800 acres are devoted to the Reynolds Homestead Forest Resources Research Center (FRRRC), created in 1969 to study forest biology, including genetics, physiology, and soils. Operating as one of the state's 11 Agricultural Research and Extension Centers, the FRRRC integrates Virginia Cooperative Extension, research, and outreach programs that impact the region, serving groups such as Master Gardeners, school students, forest landowners, and scout troops, as well as the general public.

FRRRC Superintendent Kyle Peer collaborates extensively with Lisa Martin, senior program manager at the historic property, on educational programming. "The exposure I get to the public at large by collaborating with the historical programming aspects of the homestead is invaluable," Peer said. "Instead of having one field day where the community is invited to come tour the property, individuals can come any day of the week and hike the trails, take a knitting class, or learn about grafting heirloom apple trees. Those things all get the word out about the FRRRC's outreach activities, including the classes and the resources we have available to the public."

Peer developed a trail that is part of the state's Link to Education About Forests (LEAF) program, which combines outdoor forestry and natural resources education with heritage tourism. The trail's eight stops are divided between forestry education and historical knowledge about the Reynolds Homestead.

The FRRRC is also a valuable resource for the college's forestry researchers in Blacksburg, offering an ideal setting for long-term studies.

One example is work at the genetic level to understand how trees adapt to different climates. Associate Professor Amy Brunner is able to manipulate specific genes in *Populus* species and their hybrids, commonly known as cottonwoods, aspen, and hybrid poplar, which are grown for wood products as well as bio-energy. "We can let a tree be a tree in the trials at Reynolds Homestead," she said.



The Reynolds Homestead site, the birthplace of R.J. Reynolds, includes almost 800 acres dedicated to forest research.

Associate Professor Jason Holliday, who examines the genetic basis of traits related to local climatic adaptation, added that he and Brunner use the center's new 1,800-square-foot greenhouse for the controlled experiments on tree responses. Staff members at the FRRRC do some of the monitoring and measuring of the trees in the trials, providing information to the researchers on campus.

Another project, visible from the front porch of the historic home, includes 20-acre plots to understand the management practices that influence forest growth. "We may get different answers when comparing data from the past five years to that from 35 years," said Professor Tom Fox, whose research focuses on improving the health, productivity, and sustainability of southern pine forests. The work at the FRRRC provides an established research infrastructure to study long-term questions, for example, about climate change, examining such things as management practices of fertilization, different genotypes, or numbers of trees per acre.

Professor Mike Aust directs research projects to develop Best Management Practices (BMPs) for protecting water quality. He and fellow faculty members Kevin McGuire, Chad Bolding, and Scott Barrett test forestry management techniques to understand the effects of timber harvesting operations on stream crossings, roads, and trails. The BMPs developed are shared with the industry through workshops, seminars, and publications, including Virginia Cooperative Extension activities. Research and outreach is vital to Virginia's forestry industry, which contributes \$17 billion annually to the state's economy and generates more than 103,000 jobs, according to the Virginia Department of Forestry.

"The Reynolds Homestead truly is a model facility for us as a land grant university," said Jay Sullivan, head of the college's Department of Forest Resources and Environmental Conservation. "The site provides our faculty invaluable opportunities for cutting-edge research but also gives Virginia Tech a connection to the public through outreach and education programming, serving as a community hub for festivals and events of all kinds, as a generator of local economic activity, and as a window into the history of our region."



Jason Holliday (pictured above) and Amy Brunner are conducting a study on nutrient use and tree growth response at the center's new greenhouse, which has exceptional climate control under both summer and winter conditions.



(L-R): FRRRC employees Debbie Bird, Kyle Peer, Clay Sawyers, and former student Erin Eberstein built a kiosk at the start of the LEAF trail, which is now used by hundreds of visitors, students, and hikers each year.



Kyle Peer talks to Collinsville Primary School students about forestry, natural resources, and wildlife. The topics addressed correspond to the Virginia Standards of Learning.



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