

IMPACTing

west virginia



WEST VIRGINIA STATE
UNIVERSITY

1891

Research & Public Service



IMPACTing

west virginia

AT WEST VIRGINIA STATE UNIVERSITY
WINTER 2018

ADMINISTRATION

Dr. Anthony L. Jenkins
President

Dr. Orlando F. McMeans
Vice President for
Research & Public Service

Dr. Ami M. Smith
Associate Vice President for
Public Service
Director of Extension

CONTRIBUTORS

Matt Browning
Director of Communications

Todd Griffith
Photographer

Stacy Herrick
Designer

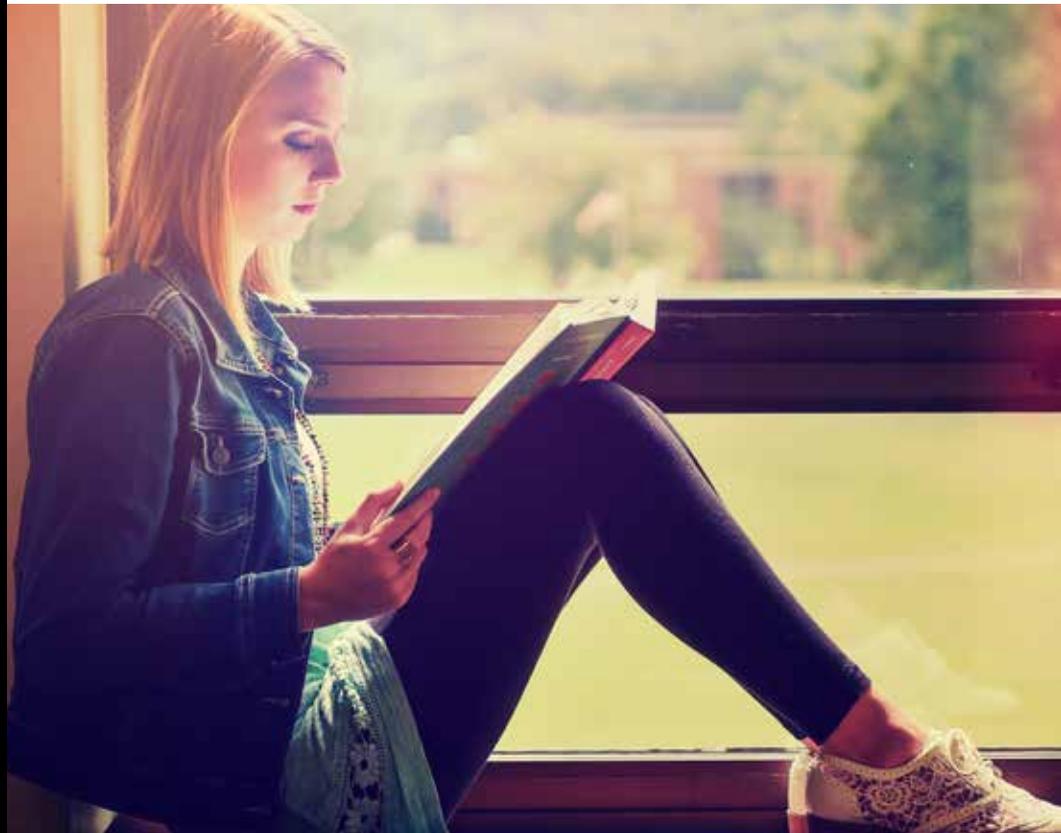
(304) 204-4300 | wvstateu.edu

Reasonable accommodations will be made to provide this content into reasonable alternate accessible formats upon request. Please contact our offices at (304) 766-5224 or justin.cherry@wvstateu.edu.

West Virginia State University Research & Development Corporation is an equal opportunity, affirmative action institution that does not discriminate on the basis of race, color, religion, sex, national origin, disability or veteran status in any of its programs or activities.

The mission of West Virginia State University is to meet the higher education and economic development needs of the state and region through innovative teaching and applied research.

- 1 **A Message from the Administration**
- 2 **IMPACTing Communities & Local Economies**
- 8 **IMPACTing Agriculture & the Environment**
- 14 **IMPACTing Families, Youth & Health**





A MESSAGE FROM THE

ADMINISTRATION



Institutions of higher education have a significant impact. West Virginia State University makes a difference because we know how communities are affected by our interactions, and change is demonstrated as a result of our work. Through our ever-expanding portfolio of innovative educational offerings, extension program initiatives and a diverse array of scientific advancement projects, I am proud of our impact in local communities throughout the state.

As you will read throughout the following pages, the impressive results of our students in and out of the classroom, research that is making our state's farmers more profitable, and our extension programs that assist families and improve the overall quality of life of our citizens prove that West Virginia State University is committed to IMPACTing West Virginia.

Best regards,

A handwritten signature in black ink, appearing to read "Anthony L. Jenkins". The signature is fluid and cursive.

Anthony L. Jenkins, Ph.D.
President



What is impact? Too often, reach is considered to be impact. While the number of people served by a program or initiative is indeed valuable information, real impact comes from knowing how an audience has been affected by our interactions. What behavioral change, or potential change, can be illustrated as a result of our work? That is real impact.

Through our ever-expanding portfolio of extension programs, research projects and outreach efforts, I am proud to say that West Virginia State University is indeed making an impact throughout the state — and probably right in your community.

The purpose of this document is not only to illustrate the University's impact through our increasing reach, but also the proof — the real results, hard data and measured or potential behavioral change that shows how we are striving to make West Virginia a better place. In the pages ahead, we tell how valuable funding and hard work are having an IMPACT on your life.

Sincerely,

A handwritten signature in black ink, appearing to read "Orlando F. McMeans". The signature is fluid and cursive.

Orlando F. McMeans, Ph.D.
Vice President for Research & Public Service

IMPACTing Communities & Local Economies

Making West Virginia's communities viable, energetic and economically sustainable is part of our vision. Primary focus areas are community development and revitalization, regional and local economic development, and small business development.

In recent years, once-thriving downtown areas in West Virginia have seen a lessening of foot and vehicle traffic. This is due to a variety of factors, including declining populations, rising unemployment, improved access to larger destinations such as the capital city, and the development of big-box shopping centers along more heavily trafficked freeways. Downtown business districts that once thrived have become home to empty streets, abandoned storefronts and businesses struggling to succeed.

WVSU extension agents are working actively in multiple counties to revitalize downtowns and help communities thrive, while outreach efforts led by WVSU students are being cited for "monumental impact" at the national level.

Recent Impacts:

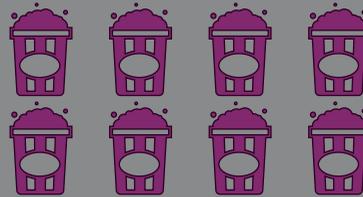
- 3,000 clients served annually at the WVSU Economic Development Center on Charleston's West Side, targeting creative economy entrepreneurs.
- More than 8,000 community members have attended Saturday Movie Night at a Fayette County outdoor amphitheater.
- 105 damaged properties have been cleaned up in Richwood.
- A projected 76,000 gallons of rainwater will be contained and reused due to conservation practices incorporated into Richwood's Helios Park.
- More than \$100,000 in funding and laboratory equipment was provided to schools impacted by the 2016 floods in an effort to rebuild science education programs.
- \$4 million in small business loan funding is available to entrepreneurs in the Hatfield-McCoy Trail region.

Read on to learn more about how WVSU is impacting communities and local economies in West Virginia.

BY THE NUMBERS



@WVSU's EDC



8,000

community members attended
Saturday Movie Night



105 properties
cleaned up in Richwood



76,000 gallons
of rainwater conserved



available to entrepreneurs in
Hatfield-McCoy Trail region



\$100k

in funding & lab equipment was
donated to flood-affected schools

Strengthening the Creative Economy

One out of three entrepreneurs in West Virginia is making a living primarily within the creative sector. As more hopeful entrepreneurs look to launch successful creative business enterprises, they are faced with a myriad of challenges, including access to affordable office and meeting space, high-speed Internet connectivity, and the exorbitant costs associated with commercial-grade equipment and access to industry experts and training. Many also state that they feel isolated and cut off from networking opportunities given the often-solitary nature of such work.

Launched in 2005 as a workforce development training center and business incubator in Charleston, the WVSU Economic Development Center (EDC) is southern West Virginia's first co-working facility that specifically targets the state's emerging creative economy. The facility features a co-working space for entrepreneurs to collaborate and feel less isolated, rentable short-term and long-term meeting and office space, a fully equipped digital conferencing center, and professional-grade voice recording and green-screen video production studios. Competitive membership rates keep costs affordable for early start-ups, and an ongoing series of "Creators Program" workshops provides free and low-cost education and training with industry experts in design, writing, acting, production, music and more.



The WVSU EDC serves more than 3,000 clients annually. Currently, the facility provides co-working and meeting space to 25 local nonprofit and community development organizations and is home to 28 creative media businesses, including videographers, musicians, producers, engineers and photographers. More than 30 new businesses were launched in 2016 by clients of the EDC. The "Creators Program" has held more than 40 successful workshops, talks and expert-led panel discussions over the past five years, allowing entrepreneurs of all skill levels to meet firsthand with such industry leaders as the poet laureate of West Virginia and the host and band members from the internationally known NPR series "Mountain Stage."

Supporting West Virginia Tourism

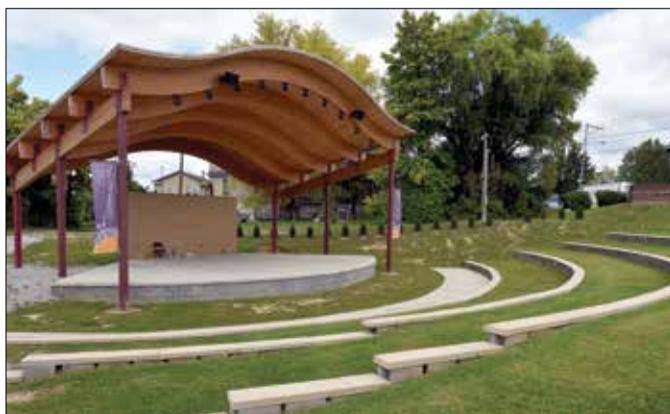
The southern region of West Virginia has long been known as the heart of Central Appalachia's coal industry. The industry's success led to a thriving economy throughout the area. The decline of the coal industry, however, has led to an increase in unemployment and a decline in population.

In an attempt to revive business opportunities for southern West Virginia, WVSU Extension Service, in partnership with the Hatfield-McCoy Regional Recreation Authority, began working in a nine-county region to shine a light on the opportunities within the tourism industry. Staff are providing technical assistance to business owners, including one-on-one consulting and training in such areas as website development, social media, business branding, leadership and accounting. Financial resources, including up to \$4 million, has been made available through small business loans. Entrepreneurs are now able to not only recognize opportunity but to take advantage of the services at hand.

The feedback from these services has been positive and uplifting for the region. To date, more than 160 residents have taken advantage of technical assistance opportunities. Currently, \$850,000 in small business loans has been provided to entrepreneurs looking to increase tourism and industry along the Hatfield-McCoy Trail system through lodging and machine rentals.

Revitalizing Downtowns

Nestled in the mountains of Fayette County, the community of Oak Hill was suffering from lacking a sense of place among its residents. Once home to a thriving downtown business district, traffic along the town's streets had greatly decreased in recent years, as residents and would-be visitors traveled to the more readily available shopping and dining options in nearby Beckley or the outdoor adventure destinations in Fayetteville.



To help revive Oak Hill's downtown district, WVSU, through a partnership with the New River Gorge Regional Development Authority (NRGRDA) and others, spearheaded the development of Destination Downtown: Oak Hill, an ad hoc association of business owners and community members charged with reawakening the town with shops, activities and — life. As a spinoff of our successful Destination: Beautification project, a 90-page guidebook for community beautification projects, the Oak Hill committee began in 2014 developing plans to turn Oak Hill into a central gathering place for community members, families and shoppers.

Recent successes include establishing a Saturday Movie Night event at an outdoor amphitheater in the center of town, at the former site of a city motor pool facility. The Lively Family Theater movie nights immediately began bringing the community together to rediscover downtown Oak Hill as a gathering place for fun, recreation and shopping. More than 8,000 people have attended the

Saturday screenings, bringing along lawn chairs and blankets, including a recent showing of the Disney film “Frozen,” which attracted more than 700 attendees. Additional activities included turning a popular bed and breakfast into a “pumpkin house” for Halloween, with more than 220 jack-o-lanterns carved by community members, accompanied by a community celebration and movie screening. More than 3,000 people, including local schools, participated. Plans for a commemorative statue and dog park are currently in development as well.

“Destination: Downtown Oak Hill is a positive group always ready to help with city projects or start their own,” said Oak Hill City Manager Bill Hannabass. “Business owners and those interested in the success of Oak Hill now have a peer group to discuss all manner of activities and trends affecting our community.”

Making Communities More Sustainable

The community of Richwood, in Nicholas County, is prone to flooding, including the 2016 floods that devastated several counties in the state. The aftermath of that particular disaster led some to compare the area to a “war zone.” The waters caused massive amounts of damage to properties throughout town, including added damage to many long-vacant properties that had already been scouted for potential removal by city planners.

Spurred by a renewed sense of energy and interest in revitalizing Richwood, community members, including WVSU's county-based extension agent, worked to gather the resources, volunteers and grant funds to remove dilapidated buildings throughout town, renovate potential properties for business development, as well as complete construction of a new sustainable green space in the center of town. Located on a corner lot that was the former site of an abandoned, boarded-up building, the green space, called Helios Park, incorporated a series of solar panels that were purchased through a Create West Virginia-led crowdfunding campaign. The panels were installed on a trellis built using wood donated by a local lumber company.

Another feature is a walkway of porous concrete allowing for rainwater management. A human sundial, in which a

person's shadow helps to tell the time of day based on the sun's location in the sky, provides a unique creative and aesthetic feature.

Facilitated by WVSU Extension Service's county agent, city planners were hopeful to find the resources to remove and clean up five nuisance structures within city limits; however, perhaps finding the silver lining of a devastating situation, a surge in interest and community efforts have led to the cleanup of 105 event-impacted structures. Renovations have also begun on a formerly abandoned building along Main Street with four storefronts. Plans are for one of the storefronts to house a heritage center and local artisan co-op, with the remaining spaces available for new business development.

The porous concrete on the walkways at Helios Park will contribute to the containment and reuse of a projected 76,000 gallons of rainwater per year — water that could otherwise contribute to flooding. Electricity generated by the park's solar panels will be used to reduce utility costs associated with the adjacent Chamber of Commerce and Convention and Visitors Bureau offices, contributing to lowered expenses and a more sustainable city.

Providing Opportunities to Thrive

The town of Hinton, in Summers County, was experiencing similar issues to those in other areas of the region: rising unemployment, a shrinking population and weakened business infrastructure. While annual events, such as the town's Railroad Days festival, increased downtown activity at certain times of the year, a more comprehensive initiative was needed to really bolster community and economic activity all year round.

WVSU Extension Service's county agent, serving as president of the Hinton Area Foundation, spearheaded the group's recent efforts to marshal charitable funds to citizens of the town interested in helping the Hinton community thrive. The Foundation supports scholarships for hopeful college students, grants for community development projects, and dedicated funding to support education, children's health, animal welfare, youth activities, the public library and more.

WVSU's local agent chaired the annual Hinton Area Foundation Autumn After-Five Event, the Foundation's largest annual fundraiser, which drew more than 155 people and raised more than \$17,000 for community development projects. In 2017, as a result of this funding, the local youth football league and high school sports teams were able to update their equipment; the public library expanded its summer reading program; and several elementary schools expanded their Science, Technology, Engineering and Mathematics education programs. Additional funding initiatives supported the public education work of the Greenbrier Valley Rural Fire Department, the foster care and adoption programs of the Children's Home Society of West Virginia, and the arts education initiatives of a variety of non-profit organizations. Lastly, funding was also used to support the annual Summers County Christmas Toy Fund, providing a happy holiday to more than 400 local children.



Nurturing Community Art Projects

Downtown Beckley, in Raleigh County, has long prided itself on its historic aesthetic appearance. In 2014, however, the town was in danger of losing its National Register of Historic Places designation by the State Historic Preservation Office due to demolition projects and alterations of historic properties. Preserving the historic integrity of the town, while also nurturing a welcoming atmosphere for new, creative ideas and projects, was imperative for community leaders looking to position Beckley as a business-friendly, vibrant destination for residents and visitors.

WVSU's Raleigh County extension agent began working in collaboration with the Downtown Beckley Business Association (DBBA), a non-profit organization whose mission is to serve local businesses, property owners, the City of Beckley and the community in revitalization of the downtown district through efforts relating to public art, streetscape improvement, design and entrepreneurship. Under the auspices of the DBBA, WVSU's local agent has hosted a variety of successful community events, seminars, volunteer activities and public arts projects, as well as received grant funding to support new initiatives. Mini-grants totaling nearly \$3,000 from Try This West Virginia (the first time the organization funded such projects) were used in public art initiatives along a rail trail running through downtown, aiming to promote the trail as a bike- and pedestrian-friendly offering. A fitness-themed mural, bike arch, signage, three bike racks and 15 bike art projects were installed along the trail. In addition, trellises were constructed and added to community garden sites. Truly a community effort, all art projects were created, painted and constructed with the assistance of local middle school students, a Boy Scout troop and a kids camp group. A local nonprofit organization donated used bike wheels for the art installation, while the City of Beckley Public Works department provided labor.

The initiative has resulted in overwhelmingly positive feedback from community members. Comments include:

- "It brightens up Beckley!"
- "This is great for our city."
- "What a difference a mural makes!"
- "It is phenomenal, and thank you one and all for the beauty you have bestowed upon Beckley."

Community development professionals from throughout the state have reached out to WVSU's agent to learn how the projects were accomplished in hopes of facilitating their own such initiatives. Additional funding totaling \$10,000 through personal donations, community foundation grants and matching dollars has been provided by community members hoping to see such work continue.

Helping Communities Rebuild

In June 2016, massive flooding led to a federal disaster declaration for 10 counties in West Virginia. Many local schools were impacted by this flooding, with buildings and supplies being severely damaged, if not destroyed.

WVSU's student chapter of the American Chemical Society (ACS) led a donation initiative with the goal of replacing damaged science equipment in the hardest-hit schools within the flood zone. Chapter members also assisted by volunteering to help sort, pack and load the equipment into vehicles so it could be transported to the schools. Additionally, local schools were served through a Community Interaction Grant written by two chapter members.



The group's efforts helped local schools, including Clendenin Elementary and Herbert Hoover High School, two heavily damaged schools, to replace their labs and science equipment. Industry and academic partners donated more than \$100,000 in funds and laboratory equipment, and a Community Interaction Grant funded hands-on chemistry demonstrations for local schools. This was a significant help to the local school system, as many of the area's elementary schools have underfunded science programs. The group's flood relief efforts received multiple awards, including a Partners for Progress and Prosperity Award from ACS and a national ChemLuminary Award citing "monumental impact."

IMPACTing Agriculture & the Environment

We are committed to conducting valuable research to advance agriculture in the state of West Virginia, and to providing education and technical assistance to farmers, commodity groups, agribusinesses and even everyday citizens with an interest in gardening. We also strive to serve as stewards of the environment, helping to preserve and restore West Virginia's natural beauty.

Through the work of our research scientists, students, faculty members and extension educators, WVSU is expanding economic opportunities for the state's farmers and gardeners; creating new, value-added crop options; beautifying our communities; protecting our natural resources; introducing new production systems; and helping our towns and people succeed.

Recent Impacts:

- Our hops production program, which is working to introduce locally grown hops into the state's booming craft beer industry, has helped 35 farmers conduct production trials and an additional 35 farmers become educated about growing processes. In 2017, brewers purchased a combined 250+ pounds of locally grown hops. The project could lead to a potential gross revenue of \$18,000 per acre of hops.
- Scientists are creating improved watermelon crop varieties that are better suited to be grown in West Virginia.
- Extension educators have planted more than 300 trees into the state's landscape and have implemented storm water runoff initiatives that will intercept 1.4 million gallons of rainfall.
- The Ravenswood Memorial Tree Program collected \$39,000 in donations to help beautify the city of Ravenswood.
- Our hydroponic growing system in Welch, W.Va., recently produced 150 pounds of fresh lettuce that fed 100 residents in a food desert region of McDowell County.

Read on to learn more about how WVSU is impacting agriculture in West Virginia.

BY THE NUMBERS

\$39,000

in donations to
Ravenswood Memorial Tree Program



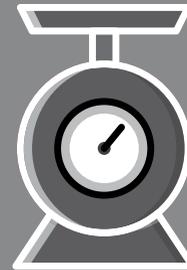
1.4 million gallons

rainfall to be intercepted over next 25 yrs



300 trees

planted throughout WV



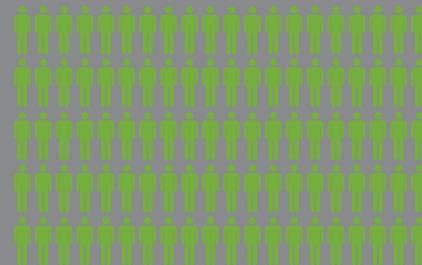
250 lbs. of WV-grown hops
purchased by local breweries

\$18k

potential gross revenue
per acre of hops



150 pounds
of fresh lettuce



...**feeding 100 residents**
of a food desert region in
McDowell County, W.Va.

Expanding Economic Opportunities

The craft beer industry is booming in West Virginia, with more than 20 active breweries in the state. While great for business and consumers, agricultural opportunities for the state’s farmers have yet to be fully realized. We are helping alleviate this issue by researching the viability of West Virginia-grown hops, which are flowers of the hop plant and a basic ingredient in beer production. Increasing hops production in the state presents a new economic driver for farmers and a more locally sourced beer for breweries to market. On average, breweries reportedly pay up to \$10 per pound for fresh, locally grown hops. If a farmer plants 900-1,000 hop plants per acre, this could lead to \$18,000 per acre in gross revenue for the sale of fresh hops. In addition, dried and pelleted hops are often more desired by breweries, with a sale price of \$20-30 per pound.



With more than \$47,000 in grant funding through the West Virginia Department of Agriculture’s Specialty Crop Block Grant program, WVSU is partnering with farmers to trial hops grown in-state, educating people about production and growth processes, and consulting with the state’s breweries on their interest in local hops.

During the program’s first three years, extension agents have worked directly with 35 farmers on production trials, another 35 farmers for information sharing, and 80 people in educational workshops and events, reaching people in 25 counties throughout the state. So far, the hops are growing well and are expected to produce approximately

two pounds of fresh hops per plant in 2018. The breweries in West Virginia have been extremely supportive of the project, with some already purchasing hops from program participants. For instance, two local brewers purchased a combined 250+ pounds of hops from participating farmers during the 2017 harvest season.

Creating New Value-Added Crop Options

While a popular fruit in West Virginia, and therefore a potentially lucrative crop for growers in the state to begin producing, watermelons do not grow well in the state’s climate. This leads to a missed economic opportunity for farmers.

WVSU scientists and students are working to develop new varieties of watermelon that are more suitable to the state’s climate, and more resistant to insects and disease, without sacrificing quality. Scientists are using hard rootstock grafting technology to graft watermelon onto harder rootstock, such as squash varieties, making it more suitable to grow in local soils.

This work has led to the identification of genes that will increase yield of seedless watermelon, a popular variety for consumers, and has resulted in the standardization of grafting technology for watermelon in West Virginia, which enhances the quality, strength and potential health benefits of fruits grown in the Mountain State.

Beautifying Communities

The city of Ravenswood, W.Va., found that many of the trees in its city parks were beginning to over-mature, were extremely damaged from weather events or were being killed by invasive insects. This was leading not only to unsightly community spaces but also to a safety hazard with potentially falling trees. Our urban forestry initiative, which includes tree plantings throughout West Virginia and educational workshops on such topics as proper tree care and maintenance, added a community beautification component to address Ravenswood’s problem. Upon learning that residents were interested in a project that would memorialize deceased members of the community, extension agents and City of Ravenswood officials developed the Ravenswood Memorial Tree

Program, which allows residents the opportunity to have a tree planted in memory of a loved one. Park-appropriate species, such as oak and maple trees, were planted throughout the city parks, replacing the damaged and dying trees, each one marked with a commemorative plaque showcasing the dedication and restoring the beauty of the town's parks and riverfront district.

Statewide, WVSU's urban forestry efforts have added more than 300 trees to the landscape and provided hands-on education on tree pruning and maintenance to more than 200 people. Since its inception, the Ravenswood Memorial Tree Program has planted 42 trees throughout Ravenswood. Commemorative benches and swings have also been introduced, adding to both the beautification and functionality components of the initiative.

Due to an outpouring of community support, totaling more than \$39,000 in donations, the City of Ravenswood recently received two awards from the West Virginia Municipal League for community enrichment and cost savings/reduction. Over the next 25 years, the planting of these 42 trees will provide more than \$10,000 in economic benefits to the city, such as air quality improvement, the reduction of carbon dioxide and \$9,000 in storm water runoff savings through the interception of 1.4 million gallons of rainfall.



Helping Communities Succeed

In West Virginia, more than one million acres of land are unable to be farmed due to improper soils, such as former surface mine sites, and being located in valleys and along floodplains, leaving crops at risk of being destroyed by the floodwaters that are known to affect the state. As the region's climate has become increasingly prone to rainfalls of shorter duration but higher intensity, flash floods have become more common, including devastating floods in 2016 and 2017 that led to declared states of emergency. Therefore, alternative growing methods are needed to ensure communities, many of which lack access to fresh, locally grown food, have the means and opportunities to make successful use of farmable acreage.

Scientists and extension agents at WVSU collaborated on an integrated research and extension project that placed an aquaponics system inside a high tunnel greenhouse in the community of Welch, located in McDowell County, an impoverished area of the state with little access to fresh, locally grown foods. Aquaponics refers to a system in which fish waste supplies nutrients for plant growth. The system, consisting of three 1,200-gallon tanks filled with tilapia, was connected to a recirculating hydroponic growing system, which allows plants to grow in the absence of soil in a raised-bed environment several feet off the ground, reducing the risk of being affected by rising floodwaters. Waste from the fish is used to feed the plants through a recirculating water system. Varying levels of nutrients are provided to the fish in each tank to study the effects of differing feed levels on both fish and plant growth, which, in the initial pilot phase, consisted of lettuce and kale varieties. Meanwhile, extension agents are providing education on alternative agriculture growing methods to the citizens of McDowell County on site at the high tunnel.

While in its early phases, the project has already provided data on how differing nutrient levels affect plant growth. The project's first harvest yielded 150 pounds of lettuce, which was donated to a low-income housing complex in Welch housing approximately 100 residents, and agents donated five rain barrels to elderly residents in need of emergency water storage. Forthcoming extension

workshops will introduce such new growing methods to local farmers, illustrating how they can make use of hydroponic growing systems to increase both crop variety and yield, and introduce them to a potentially lucrative new protein source for local growing: fish. Long term, this can lead to a stronger local economy, with successful farm enterprises located on acreage not necessarily sufficient for traditional growing methods, as well as a healthier population as the consumption of fruits and vegetables increases.



Increasing the Quality of Locally Grown Crops

Many small-scale farmers in West Virginia lack the resources necessary to maximize the life of the crops they're growing, which reduces the amount of time the produce stays fresh between harvest and consumption.

To provide buyers the best fruits and vegetables possible from their local farmer, we launched a cold chain initiative to educate farmers on proper post-harvest food handling and cold storage processes to prolong the life of their crops. This will allow them to maximize time between harvest and sell, while maintaining freshness and quality for the consumer.

Through a pilot project that provided both education and resources, more than 20 farmers have been able to extend their post-harvest timeframes using trailers equipped with cold-storage technology. A partnership with the West Virginia National Guard, which is repurposing some of the state's armories into agricultural education and resource centers complete with cold storage equipment and technology, will soon be readily available to farmers.

Improving West Virginia's Ecosystem

In recent years, West Virginia has increasingly faced pertinent energy and environmental issues, including a need to expand research into the feasibility and sustainability of alternative energy sources. Economic and environmental concerns have cast such resources as natural gas and, especially, coal into the national spotlight. As the state of West Virginia continued to explore the benefits of alternative energy sources, our university lacked a centralized, specifically focused area to enhance efforts in the alternative energy and environmental quality arena.

In 2014, we launched the WVSU Energy and Environmental Science Institute (EESI) to better focus efforts specifically on alternative energy and the environment. Scientists are conducting ongoing projects focusing on enhancing raw materials for biofuels and bioproducts, investigation of biogas and microbial genomics, re-vegetation of formerly mined lands and processes to improve wastewater quality.

In its relatively brief existence, the EESI has greatly improved WVSU's capacity to contribute to West Virginia's growing exploration of new energy sources and biological methods to clean wastewater. A \$300,000 National Science Foundation grant is funding research that will enhance crop growth on reclaimed surface mine lands, while a \$250,000 Department of Energy grant and a \$350,000 grant from the Department of Defense are allowing students and scientists to develop photosynthetic organisms to remove harmful substances from wastewater produced in the electric power generation process.



Ultimately, such work will provide reuse opportunities for formerly mined lands, as well as employment and economic development opportunities for the state's citizens.

Protecting Our Natural Resources

Development in hydraulic fracturing and directional drilling technologies has enabled an increase in oil and gas exploration and production from Marcellus and Utica shales. This expansion requires a concurrent increase in pipeline infrastructure to transfer the recovered products from production wells to downstream industry and consumers. The use of horizontal directional drilling (HDD) allows for installation of underground pipelines without the need for open-cut trenches, leaving ecologically sensitive areas and heavily used infrastructure undisturbed. However, HDD operations use and generate significant amounts of spent HDD mud that requires disposal. Scientists and students at WVSU recently completed a project seeking to determine the use of spent mud as soil amendment on farms. Use of the spent mud in such capacity can reduce operation and societal costs associated with current spent mud disposal pathways.



We conducted lab, greenhouse and field studies to evaluate the use of spent HDD mud from oil and gas pipeline crossings as soil amendment. Mud from 34 different stages of operation and locations along the HDD operation from jobsites throughout Pennsylvania, Eastern Ohio and West Virginia were collected and characterized for their

chemical and physical properties. The effect of spent HDD mud on soil properties and fertility was tested on 17 different soil types common to the Appalachian and Mid-Atlantic regions. The mud sampled in the study was composed of minerals, nutrients, metals and heavy metals at levels and composition typical to natural soil environments.

The findings revealed no foreseeable adverse effect in one-time application of spent HDD mud. This could provide both a workable solution for removing unneeded mud from the HDD project sites and a valuable source of soil amendment for farmers.

Evaluating Plant Growth in West Virginia

The pyrethrum plant has been used for centuries as a natural insecticide, such as in mosquito repellent and even as an ingredient in clothing and bedding to help repel bed bugs. Despite its benefits — it is known for being among the safest insecticides to use around food — pyrethrum plants are not known for growing well on American soils. In fact, MGK, a corporation specializing in insect control solutions, sources all of its pyrethrum internationally but is eager to bring such business closer to home with domestically grown plants.

Researchers and students at WVSU are working with the University of Minnesota and MGK to determine how well pyrethrum grows in West Virginia. Beginning in 2015, pyrethrum cuttings were planted in the University's field plots to determine how well it will grow in the state's climate and conditions. WVSU staff and students study the growth rate of the plants, record the data, harvest the flowers and send them to MGK for further analysis.

Results so far have proven surprising and successful. The plants are growing well in the Mountain State, with one harvest producing more than 300 flowers much earlier in the season than anticipated. Additional areas for potential research include determining the plant's growth rate on reclaimed mine sites. Long term, should the plants continue to prove successful on West Virginia's soils, this provides a new opportunity for the state's growers and a domestically sourced natural ingredient for the insecticide industry.

IMPACTing Families, Youth & Health

We are offering practical information for individuals, families and communities on eating well, managing money, raising children, health literacy and staying active. Meanwhile, our youth-based 4-H efforts utilize a non-traditional approach, focusing on expressive arts initiatives and STEAM (Science, Technology, Engineering, Arts and Mathematics).

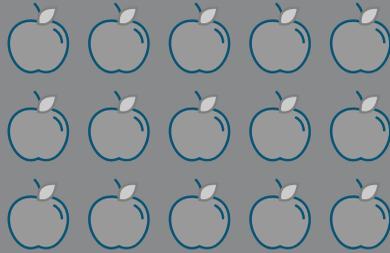
West Virginia is regularly among the states with the worst health statistics. That's why WVSU Extension Service educators are working right in our communities to improve knowledge of healthy eating and cooking, increase physical fitness, and better the overall health management of the people of West Virginia. We are also working directly with families and young people to ensure stronger, more resilient parents and children, leading to a better West Virginia today and beyond.

Recent Impacts:

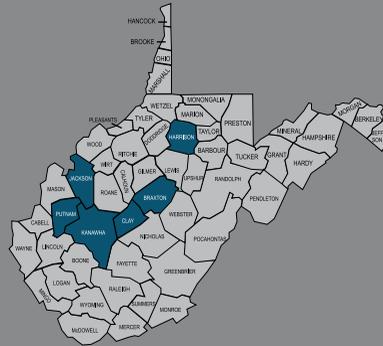
- Our health and nutrition education initiatives, including the USDA's Expanded Food and Nutrition Education Program, has reached nearly 1,500 adults and children, including a unique approach that targets people recovering from drug addiction.
- To better meet the needs of grandparents who are raising their grandchildren, our Healthy Grandfamilies program of free education, resources and support has reached nearly 100 grandparents raising upwards of 150 grandchildren across six counties.
- Improving the communication between doctors and patients is at the core of our health literacy initiatives. Anchored by a 90-page, comprehensive personal health history journal that is provided to each participant, the "Can You Repeat That Please?" program has reached more than 4,000 people in 29 counties throughout West Virginia, as well as several additional states and even Scotland.
- Our 4-H efforts have provided agricultural education to more than 600 preschoolers and reached more than 18,000 youths, parents and educators with STEAM programming.

Read on to learn more about how WVSU is impacting families, youth and health in West Virginia.

BY THE NUMBERS



EFNEP Program has reached
nearly 1,500
adults and children



Healthy Grandfamilies
has reached **six counties**
& nearly **100 grandparents**



"Can You Repeat That Please?"
has reached more than
4,000 people



4-H's STEAM programming
has reached **18,000+**
youths, parents & educators

Fighting Obesity

A 2017 report from the Trust for America's Health and the Robert Wood Johnson Foundation found that West Virginia has the highest adult obesity rate in the U.S. at 37.7 percent. The state's childhood obesity rates consistently rank among the top 10 states, including ninth in children ages two to four and fifth among teens. Providing education to both youths and adults on the importance of good health and proper nutrition is imperative to help combat such alarming statistics and improve the overall health of West Virginians.

The USDA's Expanded Food and Nutrition Education Program (EFNEP) has been influencing the nutrition and physical activity behaviors of low-income families since 1969. WVSU's EFNEP paraprofessionals are working in four counties to deliver hands-on, interactive lessons that promote diet quality, physical activity, food resource management, food safety and food security. Our adult-based EFNEP initiative has taken what is potentially a nationally unique approach to program delivery, targeting people undergoing treatment for addiction at drug rehabilitation centers and hospitals, including working with pregnant women facing addiction issues. Youth-based EFNEP efforts are targeting middle and high school students, as well as after-school programs and summer camps, with sessions that teach on the health benefits of avoiding sugary drinks, eating more fruits and vegetables, preparing healthy meals, and making better fast food and convenience food choices.

Both youths and adults are learning how to incorporate physical activity into their lives, how to shop smart at the supermarket, how to read nutrition labels and make better food choices. EFNEP efforts in 2016 and the first half of 2017 reached nearly 900 adults and their family members. Nearly 400 youths graduated from the program during the same timeframe.

Said one adult participant of a pregnancy class, who claimed to drink a 12-pack of soda per day, "You convinced me to try drinking water, and I discovered it isn't so bad. I am trying to get away from sodas and am drinking more water and less sugary drinks." Another participant, a recovering addict who recently gained full

custody of his grandchildren, said, "The things I learned in your class are really helping me. I never would have dreamed I would be raising these children alone, but you've given me inspiration, support and some valuable classes."

Strengthening Families

The prevalence of grandfamilies is on the rise across the country, especially in West Virginia, which is tied for second in the nation for the percentage of grandparents raising one or more of their grandchildren. In fact, research shows that 1 in 14 children is the product of a grandfamily home. While vital to the wellbeing of their families, grandparents often find themselves struggling with being a 21st century parent, citing issues faced by today's youth with which they have no experience in handling, from current educational standards to social media activity.

Funded by a \$600,000 grant from the USDA's 1890 Capacity Building Grants Program, our Healthy Grandfamilies program combines a series of 10 innovative discussion sessions on a variety of timely topics with three months of follow-up services with a licensed social worker. Topics range from social media to navigating the school and legal systems to health literacy and others.



To date, nearly 100 grandparents (raising 150+ grandchildren) completed the program, reporting a greater understanding of modern-day parenting, with multiple nods to the friendships and relationships they've formed and the comfort of feeling less alone in their situation.

More than 97 percent reported being better prepared to raise their grandchildren and would recommend the program to others. Surveys showed improvements on a wide range of variables, including an increase from 6.85 to 8.15 (on a 1-10 scale) in knowledge of parenting in the 21st century and a 6.33 to 8.63 increase in knowledge of strategies to improve family relationships. Participants reported improved health after participating in the project. The percentage who reported their overall health as being “good” or “excellent” increased from 55.8 percent to 60.4 percent; those reporting “lack of sleep” as a problem decreased from 53.3 percent to 39.5 percent; and the percentage reporting living a healthy lifestyle increased from 83.7 percent to 93 percent. The program continues to expand its reach, serving additional counties with a growing waiting list of interested groups. One West Virginia county outside the initial grant’s funding range was so impressed with the program that they have begun seeking funding to bring the program to citizens in their region.

Discovering the Scientists of the Future

Research has shown that early exposure to STEAM positively impacts elementary students’ perceptions and dispositions. Capturing students’ interest at an early age helps ensure that they continue on track to enter STEAM fields in college. While STEAM efforts have increased rapidly throughout the nation in middle and high school curricula, the opposite has occurred at the elementary level. In some West Virginia schools, classroom science instruction has been cut in favor of more time for other subjects. To combat this issue, igniting and nurturing an interest in science among younger students is the mission of multiple WVSU outreach efforts.

For approximately 17 years, WVSU 4-H has had the opportunity to host the Health, Sciences and Technology Academy (HSTA) Forensics Summer Institute on its campus. During the residential camp, participants learn about the forensic science techniques used in crime solving as they attempt to solve a mock crime. Skills learned in curriculum delivery are put directly into practice as students attempt to figure out “who did it?” In 2017, according to post-evaluation results, 75 percent of

the students enjoyed the program. In addition, 97 percent of students were either extremely satisfied, satisfied or fairly satisfied with the program. Even more significant, 80 percent of the students who attended the HSTA Forensics Summer Institute stated that the affiliation and interaction with university faculty members increased their interest in attending college, while 78 percent stated the stay on campus influenced their decision to attend college.



Our Center for the Advancement of Science, Technology, Engineering and Mathematics (CASTEM) works with youths in grades K-12, with a special focus on elementary-age students, supporting and expanding upon science education with hands-on activities and real-world experiences. Our two Aerospace Education Laboratories (AEL), located on our Institute campus and in Beckley, are fully equipped with the latest technologies, including aeronautics and microgravity simulation equipment. Staff members work directly in schools throughout central and southern West Virginia and open the AEL sites to interested community and student groups, including a successful initiative with home-school groups in Kanawha County. Since its inception in 2010, CASTEM has provided instruction both in the classroom and at AELS to more than 18,000 youths in 28 counties. Additionally, more than 2,400 adults — teachers, group leaders and parents — have benefited from CASTEM’s outreach efforts, educational opportunities, facility tours and training sessions.

In addition to CASTEM's efforts, the University's active student chapter of the American Chemical Society is providing hands-on STEAM instruction led by WVSU students and hosting a variety of educational science events. For instance, since 2012, WVSU has hosted the annual Brimhall Science Bowl, the largest regional science competition in the state. Over the past five years, the event has grown to include students from multiple counties, increasing from 16 to 20 teams with 100 students participating in 2017. Winners advance to a statewide competition.

In 2016, WVSU hosted the inaugural Putnam County Middle School Science Fair, which included robotics, environmental studies, engineering and mathematics — topics critical to develop at the earliest stages of educational development. Eighty students participated.

WVSU's Department of Chemistry serves as the regional coordinator for ACS's Chemistry Olympiad, a regional competition that determines participation at the national version of the event. The event provides a valuable opportunity for college students, as West Virginia's three research institutions offer scholarship money for high-achieving students. In 2016, the universities provided a combined \$354,000 in scholarships. The Chemistry Olympiad event continues to see substantial growth on the WVSU campus. The number of schools participating increased from eight to 14 between 2015 and 2017, with total students reached increasing from 322 to 538, a 67 percent increase.



Mentoring Young Leaders

Students in poverty-stricken areas of West Virginia are not meeting state or local academic achievement standards in core academic subjects, such as reading and mathematics. A powerful research base shows that attendance, behavior and course performance in reading and math are highly predictive of a student's likelihood to graduate from high school. Eighty percent of youths with these off-track indicators do not have a structured mentor to help guide them along their academic careers.

WVSU 4-H values mentoring as an important asset in a young person's life and has launched a mentoring initiative to help these young people thrive. We help students reach academic standards by offering them not only a wide array of STEAM-related activities but also programs that are designed to reinforce and complement the regular academic curricula, such as youth development activities, drug and violence prevention, art and music, technology and character education.

The program currently serves 60 at-risk youths in two different locations on the West Side and East End of Charleston. Success in our mentoring program is measured by pre-, mid- and post-surveys provided by the Office of Juvenile Justice and Delinquency Prevention and national 4-H. Surveys show that mentoring has helped participants have better self-esteem and self-confidence — necessary traits for youths to engage in teamwork and community work. Test scores in classrooms have improved by at least 80 percent, as reported by teachers and family members.

Improving Doctor-Patient Communication

Clear, concise and mutually productive communication between health care providers and patients is too often lacking, especially given the hectic, fast-paced medical office environment. Patients can be scheduled in as little as 15-minute increments, allowing for very little time to thoroughly discuss issues. Research shows that 66.9 percent of patients nationally report receiving easy-to-understand instructions about health care from their provider, which is below the 2020 target percentage of 70.5. Additionally, the percentage of patients reporting feeling as though their health care provider listened

carefully to them is only 64.1 percent — a statistic that should be much higher. Studies have shown that doctors often let patients speak for only 12 to 23 seconds before interrupting. Improving such statistics is essential to a healthy society and a strong, productive health care industry.

In 2003, WVSU Extension Service began developing a health literacy initiative entitled “Can You Repeat That Please?” aimed at improving doctor-patient communication in West Virginia. It has evolved into a comprehensive program in which participants receive instruction on how best to communicate with their doctor and a 90-page journal to log their entire health history. The journal becomes a tool for patients at health care visits, ensuring that they can clearly articulate their questions, concerns and issues, while providing doctors and nurses a thorough framework of their medical history. Since its inception, the program has added additional curricula specifically targeting youths ages birth to 18 and military service members and veterans.

The health literacy program has reached more than 4,000 people in 29 counties throughout West Virginia, as well as several additional U.S. states and Scotland. The curriculum has been shared throughout the Cooperative Extension System and adopted in such states as Alabama, Delaware, North Carolina, South Carolina and Virginia. Participant feedback has spoken to the invaluable resource being provided through the health history journal. “My son was recently diagnosed with a rare syndrome that caused him to go from no medications to four, and from one doctor to multiple specialists, as well as his pediatrician,” said one program participant. “That led to multiple test results to decipher. Having the health history journal has been a lifesaver.” Another participant, who took her parents’ journals along on an out-of-state vacation, said, “My dad had to be rushed to the hospital. When the ER staff began asking for information, I simply opened his journal and gave them everything they needed. The doctors and nurses were highly impressed that I was so knowledgeable.” Added one physician to a participant, “If every patient came in so informed and knowledgeable, so many of the difficulties we face would be eliminated.”

Curating the Farmers of Tomorrow

A person is never too young to learn about the importance of agriculture. Our PLANTERS program, which stands for Preschoolers Learning Agriculture, Nutrition, Technology, Engineering, Reading and Science, is bringing garden-based education to early learners. Extension agents and WVSU students are establishing school gardens and leading activities in preschool settings, teaching sustainability, environmental awareness and appreciation for outdoor spaces. Lessons are rooted in scientific principles and showing kids at an early age the possibilities made possible by STEAM education.



PLANTERS has been delivered at multiple schools in three counties, reaching more than 600 youths. Students at Buffalo and Hometown elementary schools in Putnam County saw the highest increase in STEAM activation and inquiry, which school administrators attributed directly to the PLANTERS interaction. Teachers also reported an increase in STEAM instruction and a decrease in fear of teaching scientific principles to working with WVSU agents. “This program provided all my students with a fresh point of view and new material,” said one teacher at Buffalo Elementary School. “The students were always fully engaged during lessons and hands-on activities. That in itself is a pretty challenging task!” “The impact of you coming to our class was that students began asking questions they normally do not ask,” added another teacher. “It broadened their vocabulary and thinking skills and piqued their curiosity for science.”



WEST VIRGINIA STATE
UNIVERSITY

wvstateu.edu

