



Environmental Stewardship

Research and Extension support resilient ecosystems.

Recent studies and programs are conserving and protecting water used for drinking, fishing, irrigation and recreation.

- **Washington** research helped establish 25 anaerobic digesters across the Pacific Northwest, turning dairy manure from more than 143,000 cows into biogas that provides more than 126 million kilowatt-hours of renewable energy per year. Digesters decrease water quality risks associated with nutrient runoff from manure and keep methane from being released into the atmosphere. Researchers also provided technical guidance to a city for a \$67 million wastewater upgrade that reclaims valuable nutrients from sewage to be recycled into sustainable fertilizers. The upgrade created over 300 local jobs. *Washington Agricultural Experiment Station; funded by State Appropriations; Smith-Lever (3b&c) Capacity Funds.*
- So far, a **Texas** Extension program has saved an estimated 3.9 billion gallons of water per year (enough to supply 35,663 households). *Texas A&M AgriLife Extension; funded by Fee-Based Funding, Non-Profit Grants & Contracts.*
- **South Dakota** studies showed deferred grazing improves riparian area vegetation and lowers levels of *E. coli*, sediment and nitrogen in downstream water. Producers reduced fertilizer use and gained healthier pastures. *South Dakota Agricultural Experiment Station; funded by McIntire-Stennis Capacity Funds, Hatch Capacity Funds.*
- Researchers in **Wisconsin** developed a more efficient approach to detect and identify microplastic particles—important information and tools for guiding mitigation strategies. *Wisconsin Agricultural Experiment Station; funded by Hatch Multistate Capacity Funds.*
- **Georgia** scientists developed an electrochemical process to degrade PFAS, a type of “forever chemical” widely present in water resources. A multi-national engineering consulting company has licensed and marketed the technology. *University of Georgia Agricultural Experiment Station.*

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The National Land-grant Impacts Database (NIDB) documents the impacts of land-grant universities’ (LGU) research, education and Cooperative Extension. The featured projects and programs are supported by a variety of funding sources and partners. Much of this work is supported by USDA’s National Institute of Food and Agriculture capacity and competitive grants programs. Capacity funding forms the foundation for the LGU’s agricultural research and Extension system.

This document was prepared by the NIDB communications team. The Association of Public and Land-grant Universities’ Board on Agriculture Assembly manages the NIDB.

- By improving detection, prevention and management, Extension programs are keeping invasive species out of bodies of water. Programs have helped manage crayfish in **Michigan's** Great Lakes, starry stonewort in **Minnesota** lakes, and a protist responsible for large-scale seagrass die-offs in **Guam**. *Michigan State University Extension, University of Minnesota Extension, University of Guam Land Grant agInnovation Research Center; funded by Smith-Lever (3b&c) Capacity Funds, State Appropriations.*



Research and Extension are supporting healthy agricultural and natural landscapes.

- Soil is the foundation of agriculture and many other ecosystem services. Information about soil type, properties and functions is essential for agriculture and natural resource management, land appraisals, urban planning and more. Soil scientists in **multiple states** are working together to make soil surveys more robust and reliable. *University of Illinois, Iowa State University, Kansas State University, Michigan State University, University of Minnesota, University of Missouri, University of Nebraska, North Dakota State University, Ohio State University, Oregon State University, Purdue University, South Dakota State University; funded by Hatch Multistate Capacity Funds.*
- To reduce the unwanted impacts of grazing livestock in **Nevada**, Extension programs provide practical education and tools such as virtual fencing to protect riparian areas and species of concern. *University of Nevada, Reno Extension; funded by Other USDA Capacity - Extension.*

Illinois researchers found that expanding agroforestry practices across just 5% of suitable Midwestern agricultural land could store 43 million tons of carbon dioxide equivalent per year. Even less intensive edge-of-field practices like riparian buffers can be beneficial. *Illinois Agricultural Experiment Station; funded by Hatch Capacity Funds.*

- **Arkansas** scientists combined artificial intelligence with satellite-based imagery to estimate forest biomass more accurately and efficiently than traditional methods, allowing for better accounting of carbon and forest management on a global scale. *Arkansas Agricultural Experiment Station; funded by State Appropriations, McIntire-Stennis Capacity Funds.*
- Over half of the forested land in the U.S. is owned privately. In **Wisconsin, Iowa** and other states, Extension programs help landowners manage forests sustainably. In **Oregon**, programs reached nearly 33,000 forest owners in 2025, and 75% are creating management plans, far exceeding the statewide average of 18%. *University of Wisconsin Extension, Iowa State University Extension and Outreach, Oregon State University Extension Service; funded by Smith-Lever (3b&c) Capacity Funds, State Appropriations.*
- Research on oak decline and regeneration in **Ohio** and **Tennessee** provided new insight into the mechanisms driving forest change. *Central State University - Research, TSU College of Agriculture Cooperative Extension Program; funded by McIntire-Stennis Capacity Funds, Other USDA Competitive, Evans-Allen Capacity Funds.*

New discoveries, tools and training support safe, sustainable pest control.

- In **Mississippi**, researchers are using GPS data and computer simulations to track destructive invasive wild pigs, guiding trapping and other management strategies. *Mississippi Agricultural & Forestry Experiment Station; funded by Other USDA Competitive, State Appropriations.*
- **Florida** scientists' breakthrough method to identify palm species resistant to a lethal fungal disease has accelerated testing from months to days, enabling faster action to protect these iconic trees. *University of Florida/IFAS Extension; funded by Other USDA Capacity - Research.*

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- Programs in **Vermont** and other states certified pesticide applicators, ensuring proper use of pesticides and reducing community complaints. *University of Vermont Extension; funded by Other USDA Competitive, State Appropriations.*

Research and Extension across the nation is helping prevent and recover from wildfires.

- **Utah** researchers identified waterways that are vulnerable to issues like flooding, sediment buildup, water treatment difficulties, and reduced reservoir capacity after wildfires. This modeling helps emergency response efforts and restoration projects target resources more effectively. *Utah Agricultural Experiment Station.*
- Extension coordination and training helped **Oklahoma** landowners safely and effectively conduct prescribed burns on more than 309,000 acres, reducing wildfire risk and improving rangeland health. This initiative has influenced national policy and inspired the creation of over 140 Prescribed Burn Associations in 19 other states. *Oklahoma Cooperative Extension Service; funded by Smith-Lever (3b&c) Capacity Funds, State Appropriations.*



Restoring wetlands provides critical ecosystem services.

- Master Gardeners and community volunteers propagated and planted over 1,000 trees in riparian areas in **Georgia**. These buffers keep water cool and provide debris that enhances stream ecology. One acre of forest buffer can remove over one ton of sediment from streams per year and provide over \$10,000 in benefits to the community. *University of Georgia Cooperative Extension; funded by State Appropriations.*
- Extension professionals in **Wisconsin** helped plant 32,000 black ash tree seedlings to restore forest wetland sites devastated by invasive emerald ash borers. These forested wetlands help mitigate flood risk, provide wildlife habitat and protect wild rice sites. *University of Wisconsin Extension; funded by Smith-Lever (3b&c) Capacity Funds.*
- Extension education in **Florida** inspired contractors and homeowners to build affordable living shorelines, which use natural materials to guard against flooding and erosion without disrupting waterflow and marine life. *University of Florida/IFAS Extension; funded by Other USDA Capacity - Extension, State Appropriations.*
- A multidisciplinary team in **Louisiana** developed tools and strategies for reestablishing roseau cane, which helps stabilize soil and reduce erosion along the coast. *LSU Ag Center; funded by Hatch Capacity Funds, Other USDA Capacity - Research.*
- Researchers in **New Hampshire** are assessing how dredged sediment can enhance marsh elevation, support vegetation recovery and improve nesting conditions for key bird species. *New Hampshire Agricultural Experiment Station; funded by Private Grants & Contracts.*
- Studies in **Montana** showed that wetland conservation and restoration significantly reduce ammonia and phosphorus concentrations within watersheds and downstream. The estimated value of improved water quality means initial investment in wetland conservation pays off in three to nine years. *Montana Agricultural Experiment Station; Hatch Multistate Capacity Funds.*

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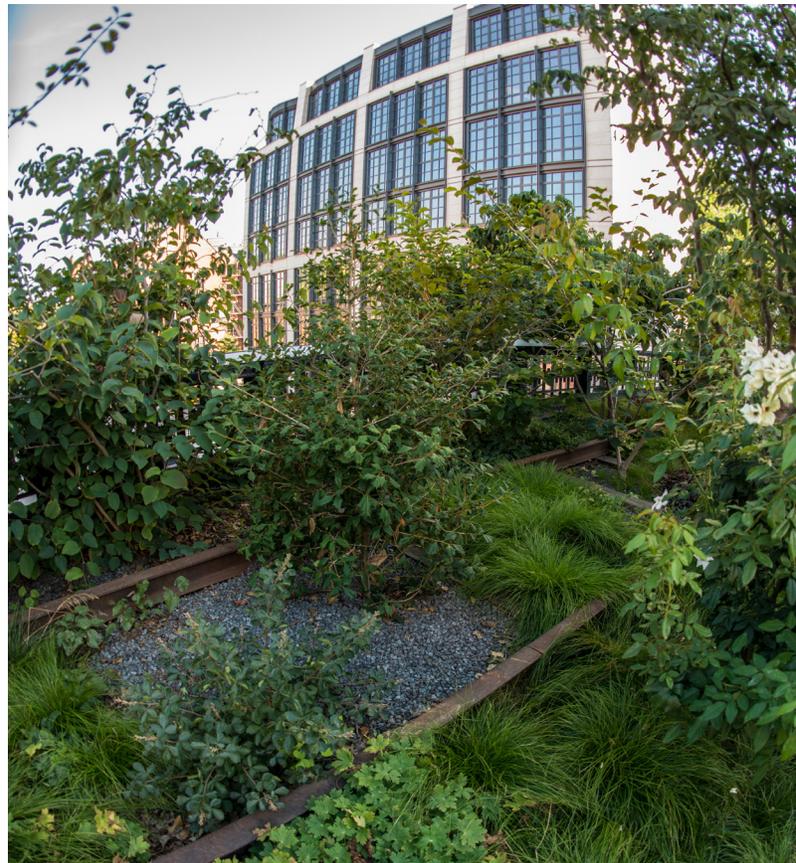
Research and outreach protect pollinators and wildlife.

- Studies in **Pennsylvania** and **California** help growers conserve native bees and their pollination services. **Connecticut** Extension programs helped landowners adopt native plants that provide habitat and forage for pollinators. *Pennsylvania Agricultural Experiment Station, California Agricultural Experiment Station, University of Connecticut Extension; funded by Hatch Capacity Funds, Smith-Lever (3b&c) Capacity, Other USDA Capacity - Extension Funds.*
- In **New Mexico**, detailed seasonal range and migration maps help management agencies conserve pronghorn, elk and mule deer. A program in **Texas** helps landowners conserve songbird habitat on their properties so they can offer birding experiences, bringing ecotourism dollars into the county. Other work is protecting imperiled species, including hellbenders in **Kentucky** and salmon in **California**. *New Mexico Agricultural Experiment Station, Texas A&M AgriLife Extension, University of Kentucky Agricultural Experiment Station, California Agricultural Experiment Station; funded by Hatch Multistate Capacity Funds, Hatch Capacity Funds, State Appropriations, Fee-Based Funding.*

Research and Extension also help create resilient residential and urban areas.

- Researchers in **California** showed that hydrogels can improve soil moisture and plant survival in city parking lots even in hot conditions, helping create greener, more livable spaces. *California Agricultural Experiment Station; funded by Hatch Capacity Funds.*
- Through Extension programs, **Colorado** parks and recreation departments and 10 HOA communities committed to applying sustainable practices, such as native plantings and reduced water use. Stewardship of urban green spaces improves environmental quality and enhances community well-being. *Colorado State University Extension; funded by Non-Profit Grants & Contracts, Smith-Lever (3b&c) Capacity Funds.*

- To reduce water, fertilizer and pesticide inputs on school grounds, athletic fields and golf courses, experts in **Connecticut, Georgia, North Carolina** and **Pennsylvania** identified turfgrass varieties that are more resilient to pests, heat, cold, drought and shade and have better color and durability. *University of Connecticut Extension, Connecticut Storrs Agricultural Experiment Station, University of Georgia Agricultural Experiment Station, Pennsylvania Agricultural Experiment Station, North Carolina Agricultural Research Service; funded by Hatch Capacity Funds, Smith-Lever (3b&c) Capacity Funds, Other USDA Capacity - Research, Private Grants & Contracts.*
- An Extension program in **Louisiana** led to the adoption of sustainable manufacturing practices, such as water and energy conservation, waste minimization and pollution prevention. Implementing these practices will save facilities an estimated \$2.8 million. *LSU Ag Center; Smith-Lever (3b&c) Capacity Funds, State Appropriations.*



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