SCIENCE & EDUCATION
Impact
Benefits from USDA/Land-Grant Partnership

Reclaim, Renew, Respect

Environment, energy, and education go hand-in-hand.

As pressures on our environment and natural resources increase, the pressure is on to find better ways to use, protect, and reclaim our land, water, air, minerals, wildlife, and plants. USDA/land-grant partnerships are doing just that by finding sources of renewable energy, new ways to reclaim land and balance urban and rural interfaces, and by teaching us all how to care for the earth.

Payoff

- **Friendly fuels.** Renewable energy is back on the policy burner, and land-grant institutions are really cooking – with corn, grease, and even straw. **Oklahoma State** is developing a bioconversion process that changes plant material, called biomass, into liquid ethanol. Similar work is under way at **Colorado State**. **Washington State** scientists are finding ways to convert crop residues and animal and organic waste into methane gas, which could generate an estimated 3.1 million megawatts of electricity annually. A **Tennessee** study is examining the use of a variety of biomass sources to fuel existing coal-fired facilities in the southeastern United States. And **Delaware State**, **Nebraska**, **Ohio State**, **Georgia**, and **Auburn** researchers are finding ways to turn everything from used cooking oil to soybeans to straw into energy. The energy content of the United States' current annual biomass production could provide more than six times the world's current energy use.

- **Remedial remediation.** The cost for cleaning up the 217,000 contaminated land sites in the United States could exceed $187 billion. Land-grant universities are finding ways to reduce that cost. **Purdue** researchers are developing plants that clean up hazardous compounds from the environment. They located genes that affect a plant's ability to take up toxins and now will use that information to develop plants extremely efficient at removing a wide range of contaminants. **Georgia's** Savannah River Ecology Lab has developed a technique to enhance natural bio-geochemical processes so soil cleanup occurs in days rather than years. An **Arkansas** study is evaluating microbes as indicators of environmental health. **South Dakota State** scientists developed a reclamation plan for the abandoned Gilt Edge Mine, the largest open pit gold mine in the Black Hills that contaminated area

RESEARCH, EXTENSION AND EDUCATION AT WORK

streams and land with a variety of chemicals, including arsenic. Today, the 70-acre mine area is a forest meadow.

- **Landfill leaps.** In 2003, New York City announced a $3.38-million project to map out the future of the 2,200-acre Fresh Kills Landfill on Staten Island. The Center for Urban Restoration Ecology (CURE), a partnership between **Rutger's** and the Brooklyn Botanic Garden, leads the effort that is the first U.S. scientific initiative established to study and restore human-dominated lands. The Fresh Kills approach is being duplicated at another 300-acre landfill in New York and at a 35-acre landfill in Massachusetts.

- **Kid-friendly environments.** Instilling awareness early is the best way to get future generations involved in environmental protection. An **Oregon State** 4-H program helped public schools fill a void of hands-on learning opportunities in the environmental sciences by establishing wildlife education sites on school grounds. **Delaware**, **Louisiana State**, **Rutgers**, **Auburn, Alabama A&M**, **Tennessee**, and **Virginia Tech** are a few of the universities with 4-H-sponsored outdoor programs and camps that teach everything from gun safety to environmental stewardship.

- **College connection.** Numerous land-grant institutions nationwide offer environmental degrees and programs. **Sinte Gleska University** (SGU) in South Dakota operates a ranch where students receive hands-on cultural training in conservation, agriculture, and animal science, which allows tribal members to reconnect with their Lakota culture and their traditional roles as environmental stewards.

- **Buffering the bumps.** Human activity and agriculture sometimes are at odds with nature, but land-grant/USDA efforts help cushion the bumps. For example, **Delaware** scientists are studying the use of trees as vegetative filters around poultry houses. Trees may reduce surface runoff and groundwater nutrient losses and filter dust, odors, and contaminants from the air. In **New Hampshire** Extension coordinates the Living Legacy Project, a public-private partnership working to protect critical wildlife and plant habitats and ecologically significant areas. In **Florida**, where 100,000 new homes are built each year, extension is helping minimize the environmental impact of these homes. Thanks to this effort, nearly 6,000 acres of an 11,000-acre project will remain a sanctuary for local flora and fauna.

- **Repelling runoff.** Nonpoint source pollution often comes from hardscapes, such as asphalt and concrete roads and drives. Impervious surfaces intensify stormwater runoff, prevent rain from replenishing underground water reservoirs, and trap warmth that heats up cities. **Wisconsin** researchers identified ways for builders to reduce the amount of hardscape on a site by 30 percent by making modest changes. **Ohio State** students and faculty helped reduce the impact of runoff into the Olentangy River watershed by creating bioswales – engineered stretches of grass, plants, trees, and bushes that filter stormwater runoff – in the watershed. These bioswales can be used by more than 250 communities in Ohio that must soon start complying with federal runoff mandates.

- **The ABCs of BMPs.** Many states are establishing rules and regulations that protect the environment and still allow for use of land and resources. **Texas A&M** scientists helped establish best management practices (BMPs) to restore rangeland ecosystems and preserve the training ground on Fort Hood Military Reservation. **Auburn** researchers worked with the state's environmental management organization to establish BMPs for catfish ponds that may soon be adopted nationwide. Scientists from **Kansas State**, working with **Colorado State**, **Iowa State**, **Michigan State**, **Montana State**, **Ohio State**, **Purdue**, **Nebraska**, **Texas A&M** universities, and Pacific-Northwest National Laboratory – are establishing BMPs for managing greenhouse gases, such as carbon dioxide.

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