Public Value in the West

An initiative of the Western Extension Directors Association

Preserve and Enhance Water, Soil, Forest, and Range Resources

Extension programs demonstrate economically viable and environmentally responsible ways to manage our natural resources. Extension addresses natural resource management in the context of sustainable farming and ranching practices that provide the public with the foods to eat. Maintaining an ecological balance for the long term ensures the public will have a safe, secure, and renewable food supply.

Relevance

Sustainable management of our natural resources is critical in the West. These resources contribute enormously to the region's economy, and their viability becomes the responsibility of everyone to protect and preserve.

Extension works to increase water availability and improve water quality*:* The West is home to some of the fastest growing communities in the nation, and these growing communities are putting additional strain on already overdrawn water supplies in the region. A major use of Western water is irrigated farmland needed to feed a growing world population. Adequate irrigation is necessary for good crop yields and quality, particularly in semi-arid and arid regions, but excessive irrigation can damage crops, and excess water can carry pollutants like chemicals and sediment into surface and groundwater.

Annual precipitation totals throughout most cities of the American West average between only 12 and 18 inches, with many parts of the South west receiving considerably less. Over 23 million people will be added to the population in the West between 2000 and 2030, increasing the strain on our already limited water supply. Agriculture accounts for more than 80% of U.S. consumptive water use, and will be the likely water source to meet future water demands (Big Picture Agriculture, 2012).

In addition to natural resource development, range, forests, and croplands support a wide variety of recreational activities and ecosystem services that promote environmental and human health. Public lands comprise 52% of the land area in the West and sustainably managing them for recreation and tourism, renewable energy development, restoration, and sustainable agricultural and forestry practices are critical mechanisms to create and support long-term employment in many areas. (Center for American Progress, 2011).

(your University) Extension, U.S. Department of Agriculture and (your state) counties cooperating.

Extension programs are available to all without discrimination. April, 2015

Your institution's logo here

Results

Of the 1,046 million acres in the Western U.S., 279 million are in farms–of which 23% are in cropland. Over half of this cropland is irrigated with approximately 74 million acre-feet of water annually (Big Picture Agriculture, 2012). According to the 2004 National Water Quality Inventory conducted by the EPA (2009), 44% of surveyed streams and rivers, 64% of surveyed lakes, and 30% of surveyed estuaries were considered "impaired," with "agricultural activities, such as crop production, grazing, and animal feeding operations" cited as the number one cause. A 2008 study by the University of Kansas found that the pollution of freshwater by agricultural nutrients costs at least $2.2 billion per year, at least $44 million of which is spent exclusively on protecting aquatic species from nutrient pollution. The U.S. Fish and Wildlife Service estimated that in 1995, 37% of all nitrogen and 65% of all phosphorus inputs to watersheds in the Central U.S. were derived from manure (Dodds, 2009).

***Extension improves cropland soils*:** Soil erosion is a large concern on public and private lands in the Western U.S. Currently the average rate of soil erosion on U.S. cropland is seven tons per acre per year (Sullivan, 2004). Erosion has many negative impacts including reducing the water-holding capacity of a given soil, stripping away nutrients and organic matter, pollution of waterways with sediment, reducing stream depth, and a reduction of fish and other aquatic populations. According to a 2006 study published in Science, the loss of soil and water from U.S. cropland decreases productivity by about $37.6 billion per year. According to the EPA, sediment is the most significant non-point source pollutant in the U.S. (EPA, 2008).

***Extension teaches the value of forests*:** National forest visitation is a critical contributor to the U.S. economy and to the economic vitality of rural communities. Between 2007 and 2011, U.S. National Forests saw over 165 million recreation visits and an additional 300 million visits to scenic byways and other travel routes near National Forest land—a steady increase from previous surveys (USDA Forest Service, 2012). Spending by recreation visitors in areas surrounding national forests amounts to nearly $12 billion each year. As visitor spending diffuses through the U.S. economy, it contributes over $13 billion to GDP, and sustains more than 200,000 full and part time jobs (USDA Forest Service, 2012).

Contact Information

References

The Bottom Line

***Extension educates to protect house and home*:** Improper management of public lands can lead to increased severity of wildfires, which in 2012 burned over 6.5 million acres across the U.S. National wildfire fighting costs have averaged $1.8 billion annually for the past five years, and the 2012 fire season was among the worst on record for many regions and states. The rising expense of wildland fire-fighting that takes place both on public and private lands costs the federal government more than $3 billion per year (a three-fold increase from the 1990s; Forest Business Network, 2014). Wildfire protection now accounts for nearly half of the Forest Service annual budget, and more than 10% of the budget for all agencies within the Department of the Interior. These figures do not include the $1 to $2 billion spent by states on wildfire protection or an untold amount spent by local governments (Headwater Economics, 2013). Large, uncontrolled wildfires result in negative impacts beyond air quality, wildlife, forests, and community damage to polluting our limited water supply. Investing in proactive forest management activities can save up to three times the cost of future fires, reduce high-severity fire by up to 75%, and bring added benefits for people, water, and wildlife (Forest Business Network, 2014).

Extension brings rangeland issues curbside: Western rangelands are characterized as arid and semi-arid, with low and variable precipitation, high evaporative demand, nutrient poor soils, high spatial and temporal variability in plant production, and low net primary production (Havstad et al., 2007). These rangelands are often subject to desertification or invasion by shrubs and other woody plants as a result of drought, low resilience, and past management practices.

Western rangelands provide over half of the cattle and the majority of sheep and goats in the U.S. Rangelands serve important ecosystem functions as well. In fact, U.S. rangelands provide habitat for 84% of mammals, 74% of birds, 58% of amphibians, and 38% of fish species. In all, over 3,000 species of wildlife use rangelands for life requirements (Yoakum & Davis, 1995). Approximately 262 million acres of U.S. rangelands are controlled by the U.S. Forest Service and the BLM and leased to private individuals for the purpose of livestock grazing (CAST, 1996). The Western states see a much higher percentage of rangelands that are controlled by state or local government agencies and leased for livestock grazing, with all these states having a high degree of intermingled public and private ownership of rangelands.

Western Extension and Outreach reached Western farmers and ranchers to mitigate these issues through the following programs (insert state-specific programs here)

- Cooperative range monitoring
- Rotational grazing
- Targeted grazing
- Range management
- Range and pasture improvements
- Low stress animal handling
- Drought response
- Master beef and cattleman programs
- Organic farming
- Urban and small farms initiatives
- Water quality programs
- Irrigation efficiency seminars
- Landscaping for fire prevention
- Homeowner forestry programs
- Invasive weed programs
- IPM
- Master Gardeners
- Building/beginning farmers programs
- Risk management
- Ecosystem services
- Estate planning (private landowners)
- Farmland protection
- Soil conservation programs

The Extension Service leads the nation in partnership programming. Extension brings agencies, organizations, funders, non-profits, groups, businesses, and individuals together to expand programming in cost-effective ways by combining expertise, providing one-stop resource fairs, sharing information, and deliberating with public input to deal with contentious issues. Partners and funders assisting with these programs include: (insert major state-specific partners and funding agencies here)

- USDA
- Western SARE
- Western Rural Development Center
- Risk Management Association
- Water Conservation Districts
- NRCS
- BLM
- Private Conservation Agencies
- Ag Commodity Groups
- Farm Bureau
- Master Gardeners

Results (insert state-specific results here)

As a result of these Extension programs:

Water:

- Reduces household water bills
- Improved water quality
- More efficient use of water for crop production
- Enhanced future availability of water for irrigated agriculture
- Reduces water application
- Reduction in the consumptive use of water
- Reduction in energy costs
- More sustainable use of groundwater
- Reduced input costs
- Reduced nitrogen leaching into groundwater
- Improved future water availability
- Increased profitability

Extension's water conservation programs educate homeowners, businesses, and farmers on how to effectively decrease water usage thereby reducing the demand on aging infrastructure and water resources and benefiting other community members by providing water when needed without additional costs. Water conservation program participants learn how to improve irrigation management and efficiency which in turn reduces irrigation water application, lowers consumptive water use, and the associated energy cost benefitting the state by contributing to sustainable use of the aquifers. Best management practices for crops, including IPM, irrigation, fertilizer, and crop choice leads to safe and sustainable use of pesticides, more profitable agricultural enterprises, and less use of water for irrigation. This benefits society as a whole by improving the competitiveness of agriculture and contributing to the quality and quantity of our water resources for all water users. Extension water conservation programs also lead to more efficient urban water use. For example, Nevada found a 33% reduction in average monthly water use and a 39% reduction in average summer monthly water use resulting from Xeriscapes, in which Extension was a major contributing partner (Sovocool and Rosales, 2001).

To lessen the strain on Western water supplies and help farmers adapt to drought condition, the Microirrigation for Sustainable Water Use Project (W-2128) has worked to make microirrigation systems easier to use and more efficient. Adopting microirrigation systems conserves water, improves crop quality, prevents runoff pollution, and saves farmers money. Improvements to microirrigation systems have had huge environmental, economic, and societal impacts.

Recognizing the need to address pressing water issues with Western agricultural producers, Extension Drought Management programs have better prepared producers for the upcoming growing season and provide cutting edge agricultural practices designed to maximize water use without compromising yields. For example, well-designed pivot systems can achieve a 90% or higher efficiency range and will use 50% less water over furrow irrigation systems. Leaving harvest residue can save a producer 3-8 inches of water from evaporation savings.

Soil:

Decreased severity of flooding

Increased yields

Improved soil fertility

Increased profitability

Reduction in wind and water erosion

Increased water quality

Reduction in greenhouse gas emissions

Extension Soil Management programs lead to greater production efficiencies, increased profitability, and enhanced soil resources. Reducing tillage leads to reduced erosion of the soil into our rivers, streams and lakes, which benefit other community members by keeping soil, chemicals and other contaminants out of our water supply for both humans and wildlife. A reduction in erosion can translate into real savings. For example, a 2008 article in Science found that the loss of soil and water from U.S. cropland decreases productivity by about $37.6 billion per year (Pimentel, 2006). These impacts expand beyond crop production as every year the U.S. spends more than $520 million to dredge waterways clogged with soil sediment (Pimentel, 1995). In addition, the adoption of conservation tillage saves farmers 306 million gallons of fuel each year, reducing the annual greenhouse gas emissions by over one billion pounds of carbon dioxide (Fawcett and Towery, 2002). In addition to helping to reduce erosion, no-till systems can increase soil fertility. They help soil retain moisture, decrease water runoff, prevent crusting, and increase the long-term accumulation of organic matter (Sullivan, 2004).

Extension's Crop Management, Farm Management, and Diagnostic Clinics help to mitigate some of these impacts through in-field, research-based training aimed at enhancing crop management skills. These programs leads to greater production efficiencies, increased profitability, implementation of best practices for irrigation and fertilizer management, and enhanced soil and water resources. This leads to safe and sustainable use of pesticides, more profitable agricultural enterprises, and less use of water for irrigation, which benefits states as a whole by improving the competitiveness of western agriculture and contributing to the quality and quantity of our water resources for all water uses. In New Mexico, forage research and extension programs have helped producers increase profitability by reducing fertilizer and seed costs by 25%, reducing water use by 30%, and increasing yields by 10%.

The Master Gardener program trains Cooperative Extension volunteers to provide horticulture education in their communities. Master Gardener programs exist in all western states. Using an economic value of $19.77 per hour of volunteer work, the value of New Mexico's Master Gardener work is equivalent to 23 full-time employees and contributes an economic value of $1,115,937 dollar benefit to the state of New Mexico. Participants of the program practice environmentally-friendly landscape principles, which leads to reduced pesticide use, water and labor inputs, as well as, increased plant diversity that benefit other community members by higher water and soil quality, reduced chemical drift, and saving of public monies.

Extension Master Gardeners also help control invasive plants thus restoring native ecosystems, educating people to be healthier through increased exercise from gardening and better diets from eating the fruits and vegetables they grow, and teaching marketable green-industry skills. In many states, Master Gardeners volunteer in horticultural therapy activities designed for nursing homes, hospitals, rehabilitation centers, prisons, and other special service facilities resulting in long-term, lasting effects on community residents.

Forests:

- Decreased severity of fires
- Increased/ higher quality outdoor recreation opportunities and visitation
- Decreased home loss due to fire
- Improved water quality

The wood products industry in the Western United Sates has been dramatically impacted by a lack of logs from federal lands, the rise in value of rural real estate prices, and the corresponding interest of people wanting to own small forested ranchettes. New, small-acreage landowners often are not aware that managing their trees helps to maintain a vibrant and ecologically functional forest that can reduce wildfire hazards, increase wildlife habitat conservation, and earn a modest income. Larger acreage landowners and natural resource managers also require access to the latest resources to effectively manage viable forested tracts. Extension forestry programs provide publications, seminars, and workshops to help landowners with trees improve their knowledge of how to care for, manage, and protect these valuable resources. Workshops include fire hazard reduction, productive soils maintenance, wildlife habitat, alternative harvesting practices, and insects and disease management. Surveys of participants show that skills in implementing improved forest conservation and management practices increased by 44%, and confirm that the indirect impacts on the communities are significant.

Improper management of public lands can lead to increased severity of wildfires, which in 2012 burned over 6.5 million acres across the U.S. Large, uncontrolled wildfires result in negative impacts beyond air quality, wildlife, forest, and community damage to impacts on water quality. Fuel management studies have shown that spread rate and flame length decrease as dry grass fuel loads decrease (Scott and Burgan 2005). Livestock grazing may modify the effects of fire in various ways, often by reducing the fuel load (Collins 1987; Noy-Meir 1995). Through partnerships with leading organizations ranging from the BLM to the Cattlemen's Association, Western Extension has worked with farmers and ranchers to help mitigate these negative impacts.

Studies suggest that the risk of losing your home to wildfire could double over the next forty years due to a combination of events including development in the wildland-urban interface (38% of all new construction) and continued drought. Since 1970, more than 10,000 homes and 20,000 other structures and facilities have been lost to severe wildland fires. Once a fire starts, there is only so much fire service professionals can do to protect structures. Extension's Firewise techniques and programs help enable individual homeowners to take an active role in protecting their structures before a fire starts.

Rangeland:

- Reduced incidence of forest fires
- Contribution to rural economies
- Maintain biodiversity
- Risk reduction which enhances the sustainability of agricultural production
- Knowledge leads to increased profitability and sustainability of operations
- Reduction of conflicts between multiple users enables cooperation
- Improve/maintain soil quality

Extension's Range Management programs assist participants in developing ranch management skills. This knowledge leads to improved profitability and sustainability of their operations. The state benefits by keeping ranch families in rural communities and improving natural resource stewardship. Extension's Educational Grazing and Range Improvement programs help producers learn how to objectively evaluate management practices leading to improved risk management, enhance agricultural profitability, and environmental sustainability. This benefits the state as a whole by improving ranch businesses and rural community viability, protecting water quality and wildlife habitat, and assuring a plentiful production for food.

Extension's Grazing Programs are uniquely tailored to address public land issues in the western United States. The programs use interdisciplinary teams of range scientists, ecologists, wildlife experts, hydrologists, agricultural economists, and livestock specialists who provide information for use in resolving resource management conflicts. These programs provide sound, scientific information that helps ranchers, land managers, and policy makers to make decisions about natural resource management and public land use. The state and region benefit as a whole through multiple use management that sustains local and state economies, improved natural resources, and enhance recreational opportunities.

trainings can have The better management of ranchland skills gained from these extension large impacts. Diamond, et.al. (2009) showed that targeted grazing in Idaho reduced Cheatgrass (*Bromus tectorum*) biomass and cover, which resulted in reductions in flame length and rate of spread. When the grazing treatments were repeated on the same plots in May 2006, Cheatgrass biomass and cover were reduced to the point that fires did not carry in the grazed plots in October 2006. Idaho researchers, Weber, et. al. (2011), showed that livestock grazing was the most effective means to reduce fuel load ($P < 0.0005$) compared to recent wildfire ($P < 0.05$) and livestock grazing with previous wildfire ($P < 0.05$). Additionally, grazing reduces fuel load in a more selective fashion (Archer 1999) avoiding the potential sterilizing effect that an extremely intense fire may have on soil. Studies in other regions have reported results that corroborate well with the Idaho findings. Within montane forests of Zion National Park, Madany and West (1983) considered livestock grazing the primary factor in the reduction of herbaceous cover. Tsiouvaras et al. (1989) reported that grazing by goats effectively reduced 1- and 10-hour fuel load in coastal forest areas of California. Similarly, Blackmore and Vitousek (2000) found grazing in dry forest ecosystems of Hawaii to be an effective means to reduce continuity of fuels, fire intensity, and fire risk.

Extension's Integrated Pest Management program results in participants increasing the use of IPM, use of PPE (personal protective equipment), and reading the label contributing to correct pesticide application practices, which leads to reduced use of pesticides and decreased pesticide exposure. This benefits the community by reducing costs to consumers, increasing health and safety, and protecting the environment.

Participants in Invasive Species Management programs learn to identify and manage or mitigate aquatic and terrestrial invasive species. They benefit by reduced pest and weed management costs and/or enhanced use of land and water resources. The public benefits through reduced costs for agricultural and natural resource products, improved access to water resources, and continuation or expansion of natural resource based activities such as tourism and outdoor recreation.