

Public Value in the West

An initiative of the Western Extension Directors Association

Community Self-Determination



Relevance

Families and communities across the West have long relied on the resources at hand to address the challenges of survival in a rugged and ever-changing environment. As a result, self-sufficiency, independence, and local determination have become central values of western culture. While the west is often known for its vast array of natural resources, many of these resources are not as plentiful or easily accessible as they once were. The same is true for the human resources needed to sustain communities across the west. Without active engaged citizens, these communities face a bleak future. When communities solve their own problems, they become less reliant on public funds and less subject to externally-imposed solutions.

Extension's Response

Research consistently shows that young people who are actively engaged in their communities are more likely to be active engaged citizens as adults. They are more likely to vote, more likely to volunteer, and more likely to serve on public boards and committees. Moreover, young people who have had experience leading or facilitating groups, setting goals, developing plans, and organizing community events possess the skills needed by communities both now and in the future.

It is important to recognize that young people have value in the present and their involvement in community processes is not just practice for a future adult role. Consequently, it is important to include the perspectives of young people in the process of framing issues and designing community-based responses to those issues.

Some organizations that promote civic engagement by young people often select only the “best and brightest” to participate in their programs.

Unfortunately, these young people are often the ones who leave rural communities to engage in higher education or seek employment.

Youth civic engagement programs must engage a broad cross-section of community's youth to ensure that youth who remain in the community have the social capital to be effective community leaders.



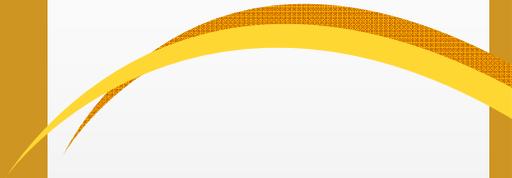
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Results

Through 4-H, young people develop internal assets and experience external supports that place them on a thriving trajectory toward adulthood. As a result they develop a sense of belonging, mastery, independence, and generosity. Together these help young people feel good about who they are, have a positive outlook for the future, and develop a sense of social responsibility. Perhaps most importantly, they instill a sense of confidence that their voices and action have the potential to catalyze community change.

The 4-H Study of Youth Development conducted by Tufts University, found that compared to their non-4-H peers, 4-H members are four times more likely to make positive contributions to self, family, community, and institutions of civil society. Furthermore, they are twice as likely to be civically engaged. When working in partnership with adult mentors, young people gain the courage and confidence to tackle complex social issues that adults sometimes ignore or avoid.

In 4-H, caring and supportive adults work in partnership with young people to engage in active discovery of the world around them. They learn new skills and use these skills as participants and leaders of valued community activities. In the west, more than 75,000 adult volunteers work with more than 1 million young people enrolled in organized 4-H clubs, camps, school enrichment activities, and afterschool programs. In addition, most states in the West offer programs that focus explicitly on developing a better understanding of local, state, and Federal government and the role that young people can play in civil society.



Contact Information

References

The Bottom Line

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Reducing health care costs



Relevance

Almost two-thirds of the growth in national healthy spending over the past 20 years can be attributed to Americans' worsening lifestyle habits and in particular to the epidemic rise in obesity rates. In 2012, Healthy People 2020 reported that 35.3% of adults and 16.9% of children 2-19 years were obese. If obesity rates continue on their current trajectories, by 2030, the Center for Disease Control and Prevention (CDC) reports that obesity rate in the Western US will range from 44-58%. Obese people spend 42% more on health services and 77% more on medications than normal-weight people.

Extension's Response

___(enter your state name) reached out to their clientele with the programming in the following areas:

(Insert the number of people trained in your state on each of the following program areas in which you do programming. For instance-- 200 people in Alaska quit smoking due to a smoking cessation program offered by Cooperative Extension.)

Alcohol and substance abuse prevention

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

Extension programs are available to all without discrimination. April 2015

As of 2012, the CDC reports that about half of all adults—117 million people—have one or more chronic health conditions. One of four adults has two or more chronic health conditions. Chronic disease account for 7 out of every 10 deaths in the US and for more than 60% of total medical care expenditure. Two of these chronic diseases—heart disease and cancer—together accounted for nearly 48% of all deaths. For cases of heart disease and hypertension, 20-40% are attributed to diet and as much as 90% of diabetes cases may be due to overweight and obesity.

Poor diet and physical inactivity cause over 300,000 deaths in the US each year and are major contributors to disabilities that result from diabetes, osteoporosis, obesity, and stroke.

In 2011, more than one-third (36%) of adolescents said they ate fruit less than once a day, and 38% said they ate vegetables less than once a day. In addition, 38% of adults said they ate fruit less than once a day, and 23% said they ate vegetables less than once a day (CDC).

Each year, one in six Americans get sick from and 3,000 die of foodborne diseases. Reducing foodborne illness by 10% would prevent 5 million Americans from getting sick each year. Preventing a single fatal case of *E. coli* O157 infection would save an estimated \$7 million.

Results

Smoking Cessation multiply number of clientele who quit smoking by \$4260. (American Lung Assoc.) (eg. In Alaska, 200 clientele quit smoking saving \$856,200 in future health care costs)

Alcohol and substance abuse Save \$18 for every \$1 spent on youth programs. (US Health and Human Services, Substance Abuse Division)

Beverage Choice, Obesity, Energy Balance Each obese person spends an additional \$1429 per year on health costs. (Center for Disease Control and Prevention)

Breastfeeding Each non-breast fed infant spends an additional \$331 to \$475 in health care costs during the first year of life. (American Academy of Pediatrics)

Chronic Disease accounts for \$3 of every \$4 spent on Health care. That accounts for \$7,900 per American with a chronic disease. (Center for Disease Control and Prevention)

Diabetes Average cost of medical care of a individual with diabetes is \$85,500. 53% is due to diabetic complications. Learning how to prevent complications would save \$45,315. (*American Journal of Preventative Medicine*)

Farm Food Safety and Food Safet Cost \$1626 per food borne illness— (*Journal of Food Protection*)

Food Security

Gluten free cooking Healthcare costs for untreated celiac disease in the US is \$5000 to \$12,000 per year. (Celiac Support Association)

Gardening, more fruits and vegetables If Americans ate just **one more serving** of fruits or vegetables per day, this would save more than **30,000 lives** and **\$5 billion in medical costs**

each year. (Union of Concerned Scientists)

Fitness and Physical Activity Save \$3.50 per \$1 spent on wellness programs—*American Journal of Health Promotions*. Or Save \$350 per year on each employee on a wellness program—Partnership for Prevention. A sustained 10% weight loss will reduce an overweight person's lifetime medical costs by \$2,200–\$5,300 by lowering costs associated with hypertension, type 2 diabetes, heart disease, stroke, and high cholesterol. If 10% of adults began a regular walking program, \$5.6 billion in heart disease costs could be saved. (Center for Disease Control and Prevention) Older adults who visited a health club two or more times a week over two years incurred \$1,252 less in health-care costs in the second year than those who visited a health club less than once a week.

Decreasing Food Deserts Those who live more than 5 miles from a grocery store had a 20% higher level of obesity and were 23% more likely to have diabetes. (California Center for Public Health Advocacy)

Food Planning and purchasing

Food preparation, cooking 8% of clients enrolled in a cooking class perceived that their family ate more healthfully after the class.

Food Preservation

Heart Disease incidence of heart disease can be reduced by 50% with prevention programs. (World Health Organization). The average cost of a heart attack is \$38,500 during the first 90 days after the incident. (National Bureau of Economic Research). The estimated out of pocket costs for a heart attack range from \$5000 to \$8000. (American Cancer Society Cancer Action Network)

Stroke- Heart disease and stroke cost the nation \$312.6 billion/year in

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Contact Information

____(enter your state name)

Contact information

Partners

Farmer's Markets

Local Farmer's

Community Garden's

Food Banks, Department of Health, State SNAP Office

Partners with SNAC (State Nutrition Action Coalition)

State Department of Education, Schools – Education (Feeding, Education, School Gardens)

Worksites

Refugees

USDA Fruit and Vegetable Program <http://>

www.google.com/intl/en/options/

Let's Move

Grocery Stores

Head start

Departments of Aging

By the Numbers

Funding for these programs came from:

USDA NIFA/EFNEP

USDA FNS

National Competitive grants programs

State/local Competitive grant programs

Local/Funding Insurance

(example: Blue Cross Insurance)

Corporations (example:

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Reducing the economic, environmental and social costs of climate variability in the West



Relevance

The USDA has identified the increasing risks such as wildfires, invasive pests, devastating floods and crippling droughts that result from climate variation. All of these risk factors are pervasive in the West. From dependence on limited water resources in the Southwest and the Great Basin, to vulnerabilities to wildfires and flooding in Alaska, the West is particularly sensitive to climate variability.

Extension's Response

Extension plays an important role in program delivery, partnership development, risk and vulnerability assessments, interpretation of forecasts and information for adaptation planning, and outreach and engagement to farmers, ranchers, forest landowners, and communities impacted by climate variability. Extension is at the forefront of risk management education focused on wildfires and floods. Extension coordinates local, state and federal action to minimize risks to life and property through programs such as *Living with Fire* and *Living with Floods*.

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

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

From its inception in 1914 Extension has successfully translated science and research into information and action strategies for farmers, ranchers, foresters, communities and individual citizens to adjust and adapt their resource management to changes in environmental, social and economic conditions. From assisting farmers to combat invasive pests such as the Boll weevil infestations early in the last century to confronting major droughts such as the Dust Bowl in the 1930's and the major droughts of the 1950's and 1980's Extension has been the key to sustaining agriculture, communities and economies in times of hardship and change.

Today, Extension programs focus on bringing climate science research and applications to the people of the West. Cooperative Extension professionals work to develop and coordinate outreach and engagement activities and applied research between the climate research organizations and individuals and communities confronting the impacts of climate variability.

Results

Utilizing re- search based knowledge from plant, soil, animal, water and climate science, and involving partners such as the USDA Risk Management Agency, Extension educators in the West work with farmers and ranchers on crop and livestock strategies to mitigate potential economic damages from climate variability and to improve productivity where changing environmental conditions may present an opportunity to manage for longer growing seasons and increased CO2 concentrations as well as optimize any potential productivity increases that may be associated with changing climate conditions.

These Extension efforts improve the sustainability of the agricultural base which is vital to state, regional and local economies. In California, for example, every dollar of value added—labor and property income and indirect business taxes—in farming and agricultural related industries generates an additional \$1.27 in the state economy.

Extension horticulturalists in the West work with home owners and the landscape industry to utilize drought resistant and water efficient

plants and the latest in efficient irrigation technologies leading to reduced infrastructure costs and stronger local and regional economies. For instance a recent Utah study demonstrated tradeoffs in costs and required inputs for a predominately cool-season turf grass landscape typical for Salt Lake City and other high desert, intermountain western United States cities and potential modifications to that typical landscape. The results highlighted strategies water conservation programs can use to encourage property owners to install and adopt water-conserving landscape features and practices.

Living with Fire and Living with Floods, and similar programs, are comprehensive, multi-agency programs coordinated by Extension and aimed at teaching residents of the West how to live more safely in high fire and high flood hazard environments. As climate variability leads to more wildfires and floods these programs protect local economies in the rural and Wildland-urban interface areas. These Extension efforts reduce governmental cost to aid victims and restore local infrastructures.



Contact Information

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By the Numbers

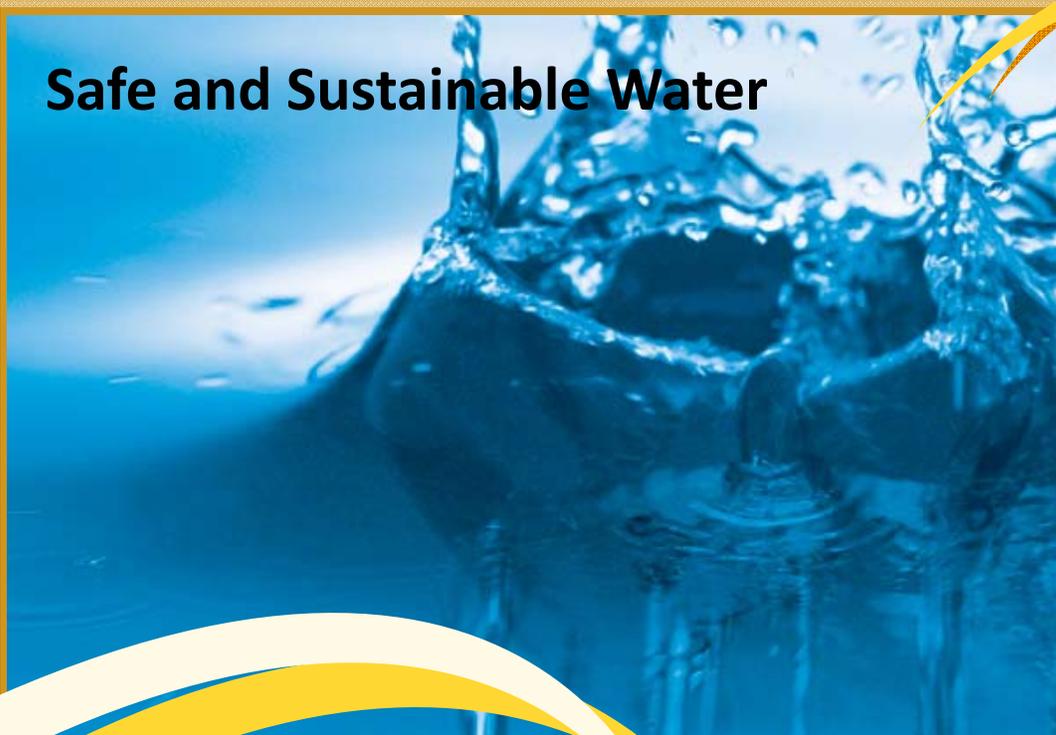
The Bottom Line

For every 100 jobs in agriculture, including the food industry, there are 94 additional jobs created

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Safe and Sustainable Water



Relevance

Water quantity challenges and the maintenance of water quality in the western region are vital to the area's survival and way of life. For example, in Washington State, Puget Sound supports \$20 billion in annual economic activity and hundreds of thousands of jobs. Puget Sound is one of the most popular venues for recreation regionally, and accounts for more than 80 percent of the state's tourism dollars (PSP, 2013).

As the region faces the challenge of supporting and protecting safe and sustainable water resources, there is the potential for unprecedented conflict. At the same time, however, the potential for unprecedented cooperation exists. Western region Cooperative Extension fills a unique role in the region by contributing credibility, objectivity, and research-based information to solutions, as well as facilitating engagement across disciplines with multiple partners and stakeholders.

Extension's Response

Western Region Extension has reached constituents with a range of programs that include water quality monitoring, indoor and outdoor water use efficiency, agricultural water use efficiency, irrigation technology and practices, storm water management, weather monitoring, cooperative management of water resources, drinking water protection, improved crop management practices, drought and flood response, riparian area protection, and low impact development.

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

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

Water is key to life on Earth, supporting human and animal health, food production, urban and rural landscapes, and natural ecosystem services. However, only a limited amount of Earth's water is potentially useful for humans and ecosystems; water covers two-thirds of its surface and constitutes 60-70% of the living world.

Average global per capita consumption of water is 327,500 gallons per year. In the western United States, though, that amount jumps to 655,000 gallons per capita per year. In the over-allocated water systems of the West, where populations continue to grow, extended drought has become a fact of life and predicted climate change poses significant supply reductions in many regions, the current level of water use cannot be sustained. Solutions for preserving the quality and quantity of fresh water are critical.

Extension has protected and sustained safe and sustainable water resources in the western region since its inception in 1914, as water is integral to agricultural production.

Today, regional Extension personnel continue to sustain and protect water resources by addressing agricultural water use efficiency, urban water supplies and demand, industrial uses, storm water management, and natural resource conservation.

Results

Agriculture

In the western region of the U.S., as much as 85% of water is used for agricultural irrigation and there are growing pressures on this water for growing urban populations and for non-traditional, non-consumptive uses like recreation and ecosystem support.

More farmers rely on Extension agents and faculty for information on reducing irrigation costs and conserving water than any other information source.

Providing this information to growers has contributed to irrigation system improvements on 13.4 million acres (65%) of the irrigated agricultural land in the region.

Urban

In the urban sector of the western region, 70-75% of total household water use is applied to amenity landscapes in the form of outdoor irrigation.

On average, Utahans participating in the USU Water Check Program save 25,750 gallons of water annually, reducing the amount of water applied to landscapes by 8%.

In Salt Lake City, UT, water savings by Water Check Program participants has resulted in a cumulative savings of 1,141,384 Kgal (thousands of gallons), while cumulative dollar savings on water bills of program participants has reached \$1,700,662.

Forest and Rangeland

In Washington State, as a result of Cooperative Extension programming efforts in 2013, sustainable management practices were applied on over 171,000 acres of rangelands and forests.

Environment

Nutrients and pathogens are of concern in the western region due to the potential for health and environmental risks along with the degradation of water resources. In Washington State more than 759,205 people have participated in Cooperative Extension natural resource stewardship programs, and 227,761 applied recommended practices and strategies to protect water quality.

Coastal and Marine

Most fresh water eventually flows to the ocean and whatever affects water inland, even far away from coastal areas, eventually impacts the health and quality of coastal and marine waters (USEPA, 1996). In the Puget Sound Basin where there have been ongoing Extension programming efforts there was a net increase of 2888 acres of harvestable shellfish beds between 2007 and 2013. In addition, between 2004 and 2012, the number of beaches meeting water quality standards for swimming increased by 4% (PSP, 2013).

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Contact Information

References

USEPA (1996): http://water.epa.gov/type/oceb/habitat/up-load/2007_06_26_oceans_treasure_treasure.pdf

Puget Sound Partnership (2013): <http://www.psp.wa.gov/vitalsigns/>

United States Geologic Survey (2014): <http://wfrc.usgs.gov/>

Northwest Fisheries Science Center, National Oceanic and Atmospheric Administration: <http://www.nwfsc.noaa.gov>

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



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).

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.

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).

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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



which in 2012 burned costs have averaged \$1.8 billion among the worst on record for many

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 educates to protect house and home: Improper management of public lands can lead to increased severity of wildfires, over 6.5 million acres across the U.S. National wildfire fighting annually for the past five years, and the 2012 fire season was regions and states. The rising expense of wildland fire-

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 programs by combining expertise, providing one-stop resource liberating with public input to deal with contentious issues. these programs include: (insert major state-specific partners and funding agencies here)

youth
programming in cost-effective
fairs, sharing information, and de-
Partners and funders assisting with
ners 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

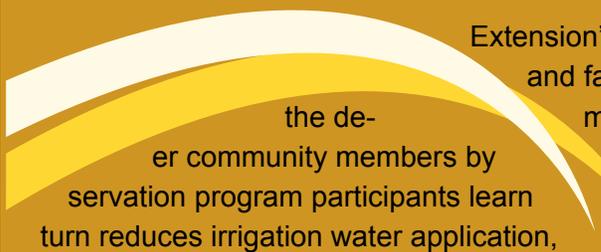
More sustainable use of groundwater

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 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).

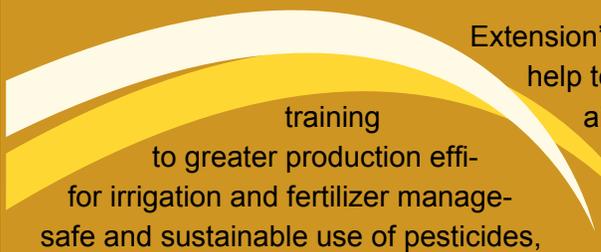
To lessen the strain on Western water supplies and help farmers adapt to drought condition, the Microirrigation for Sustainable Water Use Project (W-2128) has worked to make microirrigation systems easier to use and more efficient. Adopting microirrigation systems conserves water, improves crop quality, 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 manage- ment, 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 con-

tributing 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:

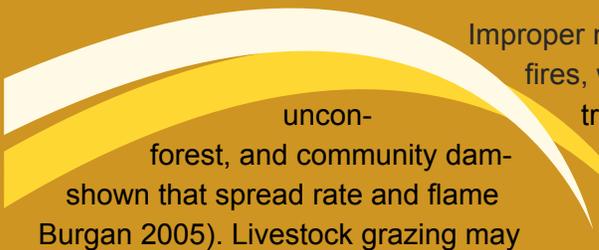
Decreased severity of fires□

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 States 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, and age 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.

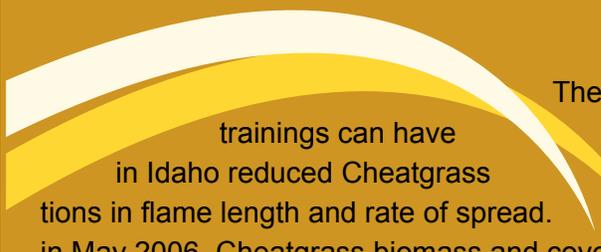
Studies suggest that the risk of losing your home to wildfire could double over the next forty years due to a combination of events including development in the wildland-urban interface (38% of all new construction) and continued drought. Since 1970, more than 10,000 homes and 20,000 other structures 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
in Idaho reduced Cheatgrass

tions in flame length and rate of spread.
in May 2006, Cheatgrass biomass and cover

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.

The better management of ranchland skills gained from these extension large impacts. Diamond, et.al. (2009) showed that targeted grazing (*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 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.