Climate Adaptation and Mitigation Policy

Boulder County Parks & Open Space

Introduction

Boulder County Parks & Open Space (POS) manages natural, cultural, agricultural, and recreational resources that are already experiencing impacts related to climate change. These impacts may increase in the future. In our 2020 Strategic Vision, the development and implementation of a policy for climate change adaptation and mitigation is an objective under Strategic Goal G: Adapt to Climate Change. This Climate Adaptation and Mitigation Policy (CAMP) outlines goals, objectives, and strategies for mitigating climate change impacts and promoting the adaptation of the resources most vulnerable to projected climate change. This plan targets the next several years of action. While the CAMP is specific to POS, it aligns with several county-wide efforts to prepare for climate change and improve resilience, including the Board of County Commissioners (BOCC) Strategic Priorities for Land and Water Stewardship, the 2018 Environmental Sustainability Plan, the Boulder County Climate Change Preparedness Plan (2012), the Boulder County Comprehensive Plan, and ongoing work at the Boulder County Office of Sustainability, Climate, and Resiliency.

We expect the current trend of rising air temperatures and precipitation variability to continue in Boulder County. Recent projections also indicate that future climate conditions will bring increased threat of natural disasters, including wildfire, flooding, and insect infestations. Many of the goals outlined below focus on climate change mitigation in the form of carbon sequestration and reduced greenhouse gas emissions, as well as adaptation of vulnerable resources including agriculture, native plants, wildlife, and water. The CAMP is intended to be an adaptable and timely document that will inform future management plans, department policies, and guiding documents. It should be updated regularly to incorporate new data and address emerging challenges related to climate change.

Goal 1: All future POS management plans, policies, and guiding documents incorporate climate adaptation and mitigation goals, objectives, and strategies.

Objective 1: Include climate adaptation and mitigation in POS Strategic Plan for agricultural, cultural, natural, and recreational resource management.

Objective 2: Maintain CAMP working group to provide input on future management plans, policies, and guiding documents, and identify opportunities for plan/policy updates related to climate adaptation and mitigation.

Objective 3: Update the CAMP every three years to ensure that it remains relevant and adaptable as new data and climate challenges emerge.

Goal 2: Become a leader in carbon sequestration through land management.

Objective 1: Enhance soil health and increase carbon sequestration using the most cost-effective and best available science and technology to improve agricultural production on leased agricultural properties and protect native grassland, wetland, and forest ecosystems.

a. Complete the 5-year carbon sequestration pilot study initiated with Colorado State University, review results and economics, and recommend next steps for broader implementation.
b. Prioritize compost soil amendments in accordance with Boulder County restoration specifications to reduce use of commercial fertilizers to enhance soil health in agriculture and restoration.
c. Encourage all farm tenants to improve soil carbon stocks with best management practices.
d. Investigate the efficacy and feasibility of biochar and green manure application on open space in Boulder County.

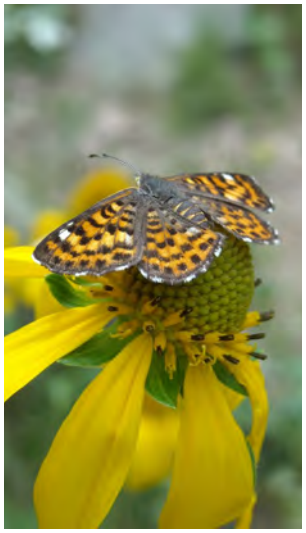
Objective 2: Continue and expand education efforts on the impacts of climate change and the benefits of soil carbon sequestering practices to private landowners, tenants of county open space, and the public.

a. Continue educational efforts such as the Soil Revolution conference and other workshops, on farm visits and in demonstrations to enhance landowners' and producers' understanding of soil health and carbon sequestration best practices.
b. Continue to educate agricultural producers, conservation easement owners, and other landowners in Boulder County to improve resilience through incorporation of soil health principals and provide assistance and education in alternative crops and practices for changing climate and economic conditions. Recommend vegetation management (including the use of native plants in landscapes and non-farmed areas) and soil health practices and their associated soil carbon storage benefits.
c. Incorporate climate change and soil health specific public programming into Education and Outreach annual plan and goals.
d. Develop and provide climate change specific advanced training opportunities to staff, volunteers and the public, including but not limited to, scientifically based anticipated environmental and social impacts, safety considerations, and mitigation practices in a changing climate.
e. Integrate the most up-to-date information and public safety recommendations regarding climate change and soil health into online, print, and other outlets for education and outreach to the public.

Goal 2: Become a leader in carbon sequestration through land management continued.

Objective 3: Support implementation of practices that reduce carbon emissions and enhance soil health on agricultural lands including maintaining and enhancing existing vegetation, cover crops, compost addition, windbreaks, slow release fertilizers, grazing management, and reduced-tillage farming.

a. Evaluate cost effective ways to incorporate these practices into every farm operating plan on POS agricultural land.
    - Use COMET-farm (a farm and ranch carbon accounting system) to quantify the potential carbon benefits of activities outlined in Objective 3.
b. Incentivize adoption of new practices that contribute to carbon sequestration, reduce greenhouse gas emissions, and advance other BCPOS climate goals. Investigate financial incentives to farmers adopting these practices.
c. Continue to advocate committing resources to finding a local composting option in Boulder County.
d. Establish an interdisciplinary riparian grazing team to develop best practices and guidelines to encourage and integrate riparian corridor protection on county land.



Objective 4: Quantify expected carbon sequestration from applicable practices (e.g., compost addition, riparian vegetation planting) in natural ecosystems (including riparian, grassland, and forest areas) and implement three demonstration projects on Parks & Open Space land that increase carbon sequestration in these areas.

a. Identify restoration projects to increase carbon sequestration on grasslands including applying compost on rangeland sites where appropriate, increasing invasive weeds management on grasslands, and quantifying carbon sequestration in treated areas.
    - Use COMET-farm to quantify the carbon benefits of flood restoration projects since 2013.
    - Use COMET-Farm to quantify the potential carbon benefits of future riparian restoration.

Objective 5: Maximize the carbon sequestration potential of POS by acquiring priority land and water that offer the greatest carbon sequestration capacity as estimated by COMET-farm, including natural lands and agricultural lands.

Goal 3: Increase water quality, quantity and efficiency and maximize beneficial uses of water for sustainable agriculture, aquatic ecosystems and riparian habitats.

Objective 1: Prioritize acquisitions of water rights that fulfill current and anticipated agricultural and ecosystem needs identified by the POS supply analysis and resource inventories.

Objective 2: Research, identify, and invest in the most cost-effective areas to achieve greater water efficiency across water uses on agriculture, facilities, and natural areas.

Objective 3: Maximize carbon sequestration potential in riparian systems by developing infrastructure for off-stream watering of livestock that protects riparian vegetation and water quality and is done so within the legal decree of our current water rights and state water law.

Objective 4: Investigate opportunities for POS to partner with local municipalities, the Colorado Water Conservation Board, and other water interest groups for in-stream flow and ecosystem enhancement to restore the hydrograph and expand wetlands in priority areas.

Objective 5: Identify and advocate for changes in state and regional water policy that ensure water efficiency gains and promote flexibility for ecosystem services.

Goal 4: Maintain agricultural viability in a changing climate.

Objective 1: Continue to strengthen the local food web. Expand local and value-added markets to reduce the environmental footprint while helping producers capitalize on changes in markets due to environmentally-conscious consumer demand.

Objective 2: Encourage diversified crops and rotations to increase resilience and reduce environmental and economic risk associated with extreme climate events.

a. Explore crops and crop rotations (drought-tolerant crops or varieties, shorter or longer growing season, legumes, pulse crops, fruits and vegetables, and others) that could reduce the impact of a crop failure due to changes in weather patterns.

Objective 3: Incorporate livestock on rangeland, irrigated pastures, and crop land to achieve healthy ecological function, utilize crop residue, build soil, sequester carbon, diversify operations, and benefit productivity.

Objective 4: Utilizing a diverse set of approaches, promote, incentivize, and facilitate maintaining crop residue in the field and the use of cover crops to protect soil and water quality from soil erosion due to extreme precipitation and wind events.

Objective 5: Focus more county resources on properties identified as high-risk for negative impacts from changing weather patterns by restoring diversity and improving degraded land.

Objective 6: Focus on soil management practices that increase infiltration rates and water -holding capacity.

Objective 7: Complete comprehensive baseline wetland and riparian habitat inventory, including spatial extent, quality, ecosystem function, and species supported on all agricultural properties.

Goal 5: Protect and restore habitat diversity and connectivity to provide capacity for species and ecosystems to adapt to climate change.

Objective 1: Protect and restore streams and wetlands and mitigate wetland impact, especially in high-priority areas for landscape connectivity and diversity.

a. Complete comprehensive baseline wetland and riparian habitat inventory including spatial extent, quality, ecosystem function, and species present.
b. Identify and prioritize opportunities for wetland restoration.
c. Integrate stream and wetland preservation and restoration that will enhance ecosystem function and resilience. Incorporate elements of channel complexity, backwaters, connected floodplains, beavers, and beaver dam analogs where appropriate.
d. Remove invasive trees and shrubs (including but not limited to, Russian Olive *[Elaeagnus angustifolia]* and Tamarisk *[Tamarix chinensis]*) and restore native vegetation along riparian corridors and in wetland ecosystems.

Objective 2: Protect and restore native grassland habitat.

a. Maintain and increase current extent of mapped grasslands in Boulder County, especially in priority areas for habitat connectivity and diversity.
b. Assess where future climatic conditions might best support native grassland communities and plan restoration and protection actions accordingly.

Objective 3: Facilitate anticipated species movement resulting from a changing climate.

a. Identify and promote potential stands of naturally occurring lower elevation mixed conifer forest structure in the mid and upper elevational range of Boulder County.
b. Promote mosaic patterns in structural diversity of Boulder County's forest ecosystems.

Objective 4: Encourage internal staff and require contractors to delineate planned disturbance areas for impacts larger than 400 sq.ft. mark and adhere to planned haul routes and minimize soil compaction.

Objective 5: Prioritize acquisitions to facilitate habitat connectivity and anticipated species movement.

Goal 6: Assure all POS Infrastructure and restoration projects are built to be resilient to future climate changes.

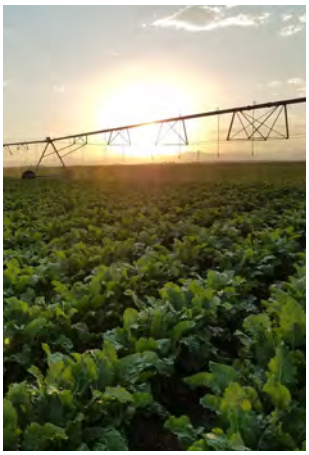
Objective 1: Design trailheads for a changing climate–install trees and shrubs that sequester high volumes of carbon when not prioritizing native species.

a. Prioritize materials that are reused, recycled, and/or from locally owned businesses over other options when designing trailheads, even if they are more expensive or more complicated to install.

Objective 2: Plan for anticipated natural disasters resulting from climate change to minimize negative impacts.

a. Reinstate or enhance floodplain connectivity where appropriate and feasible.
    - Maintain and monitor completed flood recovery restoration projects along major waterways in Boulder County for native vegetation establishment, soil moisture and content, and wildlife habitat.
    - Identify and prioritize other stretches of riparian restoration in which floodplain connectivity and habitat quality could be improved.

b. Continue and expand forest restoration actions in the lower montane to encourage forest fire resiliency and reduce carbon release during prescribed fire operations and wildfires.
    - Continue in-house and contracted forest thinning operations.
    - Identify areas of Boulder County's forest system in which a 'Let it Burn' policy could be safely applied.
    - Increase native plant diversity on open space lands.
    - Restore degraded areas using native plant materials and best management practices.
    - Continue and expand native seed collection and increase efforts for use in restoration.
    - Provide pollinator habitat in current and future restoration plans and land management actions.
        - ♦ Diversify native floristic structure using forbs and flowering shrubs.
        - ♦ Provide and protect pollinator nesting habitat, including solitary wood cavity nesters, ground nesters, and cliff nesters.



Goal 7: Reduce POS-related energy and water use.

Objective 1: Determine the feasibility of renewable energy generation on farms to meet the energy demands of that farm operation.

Objective 2: Launch a new initiative to reduce electricity use at BCPOS offices and managed houses.

a. Work with Building Services to update office spaces with motion-activated light sensors.
b. Prioritize power-down campaign in all POS offices.
c. Construct and utilize solar-powered power stations to replace gasoline/ diesel generators for electrical needs on county work sites.

Objective 3: Reduce staff reliance on single occupancy vehicle commuting.

a. Update the telecommuting policy and expand accessibility to allow more flexibility for staff to work from home and/or while riding public transit and/or in vanpools.
b. Have the POS Sustainability Committee host an annual carpool/vanpool facilitation event to help staff organize ride shares.

Objective 4: Work with Building Services to investigate feasibility of transitioning to low-maintenance and low-water landscaping around POS offices to reduce our use of fossil fuels and water in landscape maintenance activities.

Objective 5: When possible, enroll eligible heavy machinery into 2-year leasing programs to ensure equipment is up-to-date and energy efficient.

Goal 8: Implement Boulder County's Zero-Waste policy throughout the POS system.

Objective 1: Continue to provide education and training opportunities to POS Staff, facilitated by the POS Sustainability Committee.

a. Conduct a Parks & Open Space waste audit every three years and communicate results to staff.
b. In collaboration with Boulder County Resource Conservation, provide approved list of zero-waste [catering] businesses to staff for use in all meetings or public gatherings.
    - Conduct inventory of local food-based businesses (within 20 miles of meeting location) for zero-waste practices.
c. Continue to facilitate Zero-Waste annual training for POS staff.
    - Coordinate with Boulder County Resource Conservation Department to schedule and host annual training.
    - Communicate any changes to Zero-Waste guidelines to POS staff as needed in-between annual trainings.

Objective 2: Provide waste diversion options at POS trailheads, sort yards, and on POS projects.

a. Equip every new trailhead with trash, recycling, and compost (where feasible) receptacles to encourage ongoing waste diversion in our public spaces.
b. Utilize materials generated from forestry operations for fencing materials, signage, and other infrastructure whenever possible. Support efforts to obtain a portable sawmill to increase wood use from forestry operations as a local source for repairs, Infrastructure and building needs.
c. Continue supporting the Community Forestry Sort Yards and expanding wood utilization by the public and POS.

Glossary

Beaver dam analog (BDA) – A man-made structure designed to mimic the form and function of a natural beaver dam. Beaver dam analogs slow water velocity, allowing suspended particles to settle like natural beaver dams. As sediment accumulates the stream bottom rises, resulting in corresponding elevations of the surrounding water table. Streambanks become less steep and the stream once again becomes hydrologically connected to the floodplain. With higher ground water, native shrubs and trees begin to return, which attract beavers and allow for more successful beaver population re-establishment. Beavers continue the stream restoration process by building their own dams, often on top of the BDA's.

Biochar – Biochar is a soil amendment used to improve soil structure, water holding capacity and microorganism habitat. It is a charcoal-like substance that's made by burning organic material from agricultural, horticultural and forestry wastes (also called biomass) in a low oxygen process called pyrolysis. The burned material is converted into biochar, a stable form of carbon that can't easily escape into the atmosphere and is stable in soils. Biochar composition is approximately 70 percent carbon. The remaining percentage consists of nitrogen, hydrogen and oxygen and other elements. The feedstocks used in making biochar would release more carbon dioxide if allowed to decompose on their own. Biochar is black, highly porous, lightweight, fine-grained and has a large surface area in which helps store carbon in soils for decades or centuries.

Carbon sequestration - A natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form, preferably in the soil. Carbon dioxide is the most commonly produced greenhouse gas.

COMET Farm – COMET Farm is a USDA online carbon-capture calculation tool in which producers enter information about their land and management practices, including location, soil characteristics, land uses, tillage practices and nutrient use into the tool. The tool estimates the environmental benefits associated with particular conservation practices for cropland, pasture, rangeland, livestock operations and energy use. Parks & Open Space is utilizing the tool for evaluating carbon capture on grasslands, rangelands, wetlands and agricultural lands.

Ecosystem service – Ecosystem services are the direct and indirect contributions of ecosystems to human well-being. They support our survival and quality of life. The benefits that humans may gain from ecosystems are services like food, water, fiber, wood, medicines and genetic resources. Ecosystems help regulate climate and natural hazards, purify water, manage waste, provide pollination or pest control; supporting services like nutrient cycling, soil formation, migratory species habitat and viability of gene pools. Ecosystems also have cultural services (non-material benefits) like spiritual, recreational, religious, intellectual development and aesthetic value.

Green manure – A fertilizer consisting of annual plants that are plowed back into the soil or allowed to decompose at the soil surface. Green manure crops may be annual grasses like oats, wheat or triticale, legumes such as beans, peas or annual clover, or other annual crops.

Supply analysis – In general, a detailed review of inputs used to assess how the available quantity of a product is affected by changes in demands, input factors and production techniques. At POS, supply analysis is used to prioritize water rights acquisitions to fulfill current and anticipated agricultural and ecosystem needs.

Zero waste – The conservation of all resources by means of responsible production, consumption, reuse, product recovery, and packaging and materials without burning or any discharges to the land, water or air that threaten the environment or human health. Boulder County Zero waste policy weblink.