

The map displays Chaffee County, Colorado, with the Arkansas River flowing through it. Major towns and cities are marked, including Buena Vista, Johnson Village, Nathrop, St. Elmo, Alpine, Centerville, Leadville, and Salida. The Arkansas River is highlighted in orange, and its tributaries like Cottonwood Creek, Chalk Creek, and Trout Creek are shown in blue. Mountain peaks such as Mt. Oxford, Mt. Belford, Mt. Columbia, Mt. Yale, Mt. Tabeguache, Mt. Shavano, and Mt. Ouray are indicated with mountain icons. Passes like Cottonwood Pass, Tincup Pass, Hancock Pass, and Monarch Pass are also labeled. Highway routes 24, 285, 285.5, 91, and 50 are shown with their respective shields. The text 'CHAFFEE COUNTY WASTE AUDIT REPORT' is overlaid in large, bold, dark green letters.

CHAFFEE COUNTY WASTE AUDIT REPORT

GREATER ARKANSAS RIVER NATURE ASSOCIATION

Prepared by Erica Wohldmann-Gift Ph.D. & Dominique Naccarato M.E.M..

December 2020

Acknowledgements

The Chaffee County Waste Audit was completed by the Greater Arkansas River Nature Association (GARNA) with grant funding from the Chaffee County Community Foundation with support from Nestlé Waters North America. This report was also made possible with the support of: Mickey Barry, Angel of Shavano Recycling; Chaffee County Waste; Becky Venes, Chaffee County; Julie Mach, Elements Mountain Compost; and Beth Lenz, Upper Arkansas Area Council of Governments. Thanks also to Kelsey Kirkwood, GARNA Community Outreach Associate for providing photos and assistance with graphic design.

Executive Summary

The amount of waste entering the landfill—across the county, the state, and the nation—exceeds what is necessary. In fact, nearly 95% of Colorado's waste could be recycled or composted. In Colorado, 32% of all trash could be recycled (e.g., bottles, cans and paper), 37% could be composted (e.g., grass clippings, food waste and clean wood), and 26% could be reused or recycled through specialized programs for textiles, electronics, construction materials, and other bulky materials.

The data collected for this report suggests that it is possible for Chaffee County to achieve similar diversion rates if partnerships were formed with recyclers and businesses in Chaffee and other counties—and with increased engagement from Chaffee businesses and residents.

Data Collection and Methodology

To conduct this waste audit, data was collected from: the Chaffee County Landfill, which receives waste from three commercial waste service providers (Chaffee County Waste, Shamrock Disposal Services and Waste Management) that operate in Chaffee County. These entities provided data from 2018, 2019, 1st quarter of 2020; recycling providers included Angel of Shavano (with data from 2018, 2019); Chaffee County Waste (with data from 2019), which takes recyclables collected in Chaffee County to Teller County; and Elements Mountain Compost (EMC) provided data from 2018, 2019. The data received was sorted by material type for all but Chaffee County Waste because only a combined total for recyclables transported out-of-county was provided.



The Chaffee County Landfill records weights for some materials such as compacted trash and concrete. Weight is measured in tons. Volume is recorded for other materials such as household and yard waste. Volume is measured by the cubic yard. Finally, counts are recorded for items such as animals and television monitors, rather than weight or volume. EMC records the volume of all compostable materials collected. Angel of Shavano and Chaffee County Waste both record the weight of all recyclable materials collected.

Data Collection and Methodology

In order to allow for comparisons between waste service providers and the type of material collected, volume and counts were converted into weights. This was done using a variety of standard procedures. For example, the US Environmental Protection Agency provides conversion tables for some materials such as yard waste and compostable materials. In other cases, such as with large animals, small animals, and television monitors, for example, the weights of at least five types or brands were used to calculate an average for each category. In the end, some assumptions were necessary. A full spreadsheet with those assumptions and calculations was delivered to GARNA as a separate attachment to this report (Appendix A).

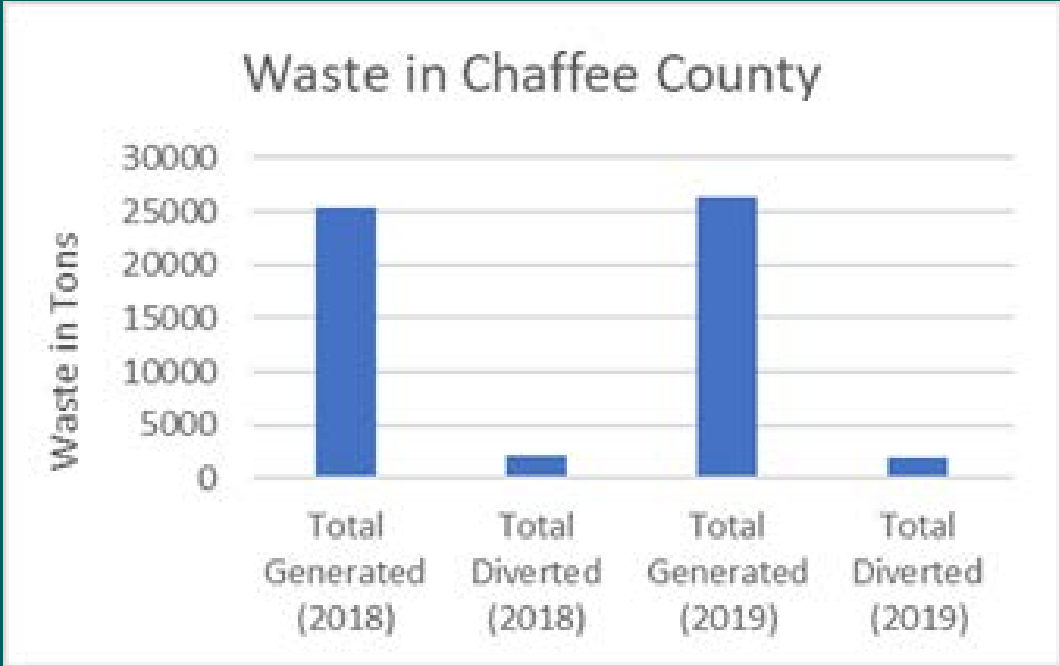


Results- Chaffee County's Waste

In 2018, Chaffee County generated 25,420 tons of waste, of which 2,058 tons were either recycled or composted (see Figure 1). In 2019, waste generated in Chaffee County increased to 26,237 tons, however, only 1,912 tons were either recycled or composted (see Figure 1).

1

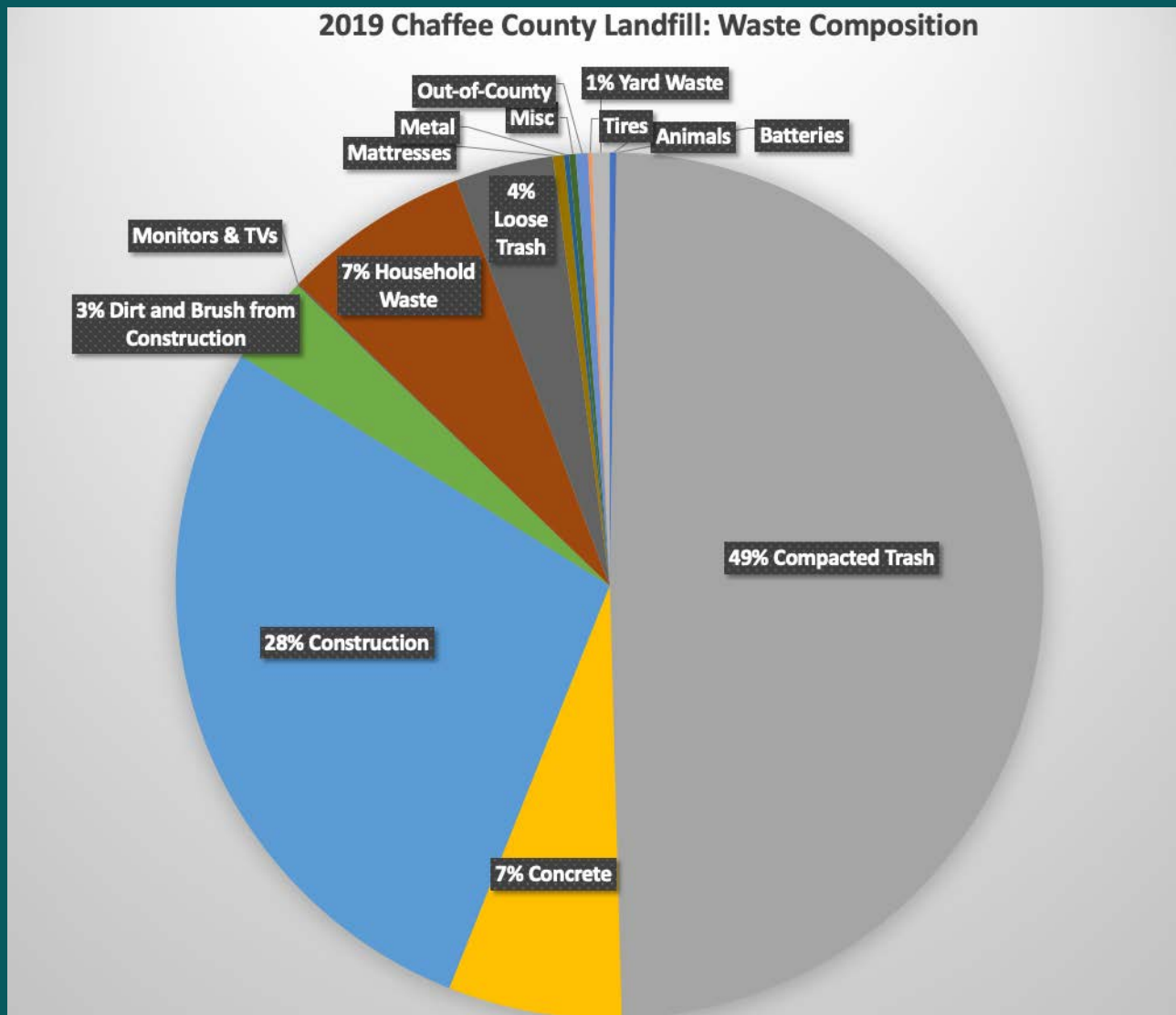
Figure 1. Waste generated and diverted in Chaffee County in 2018 and 2019.



Results- Amounts and Types of Waste

The amount of waste generated in 2019 was sorted by material type (see Figure 2). The category "Compacted Trash" makes up 49% of the waste generated in Chaffee County.

2 Figure 2. Waste sent to Chaffee County Landfill in 2019 by Type of Material

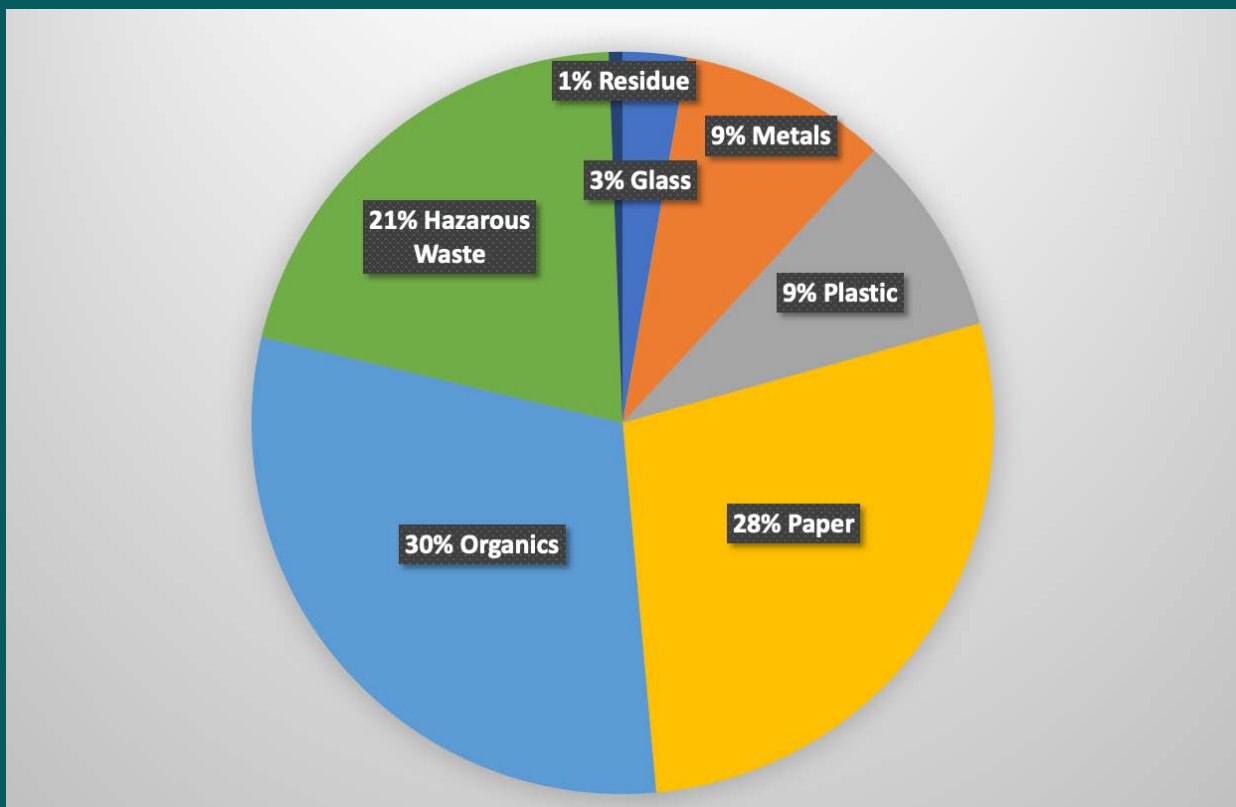


Results- What is Compacted Trash?

Compacted trash includes municipal solid waste that gets picked up at homes by our waste service providers, as well as waste generated at local businesses and public buildings. This waste is taken to the landfill in trucks. Since the present study did not assess the contents of compacted trash, it is unclear how much of the material in this category could be recycled or composted. However, data from the Waste Optimization Regional Study conducted by the Upper Arkansas Area Council of Governments (UAACOG) in 2017 found that 79% of compacted trash (municipal solid waste) could have either been recycled or composted (see Figure 3).

3

Figure 3. Composition of Compacted Trash (MSW) found by the UAACOG Regional Waste Study in 2017.



Results- What is Household Waste?

As shown in Figure 2 above, the category “Household Waste” is waste that residents take to the landfill themselves. This category makes up 7% of the total waste generated, and the contents are likely similar to what the UAACOG found in their 2017 samples of Compacted Trash—49% recyclable and 30% compostable. In fact, according to the US EPA, and confirmed by the waste study conducted the UAACOG, food scraps and yard waste make up nearly 30% of what we throw away. This type of “trash,” along with dirt and brush from construction (3% of waste) and yard waste (1% of waste), could be composted instead. Making compost keeps these materials out of landfills where they take up space and release methane, a potent greenhouse gas.



Other major contributors to Chaffee's waste stream include concrete and construction materials. These make up 34% of the waste generated in the county, reflecting population growth and building improvements/remodels.

Results- Hazardous Waste



Contents of Household Trash and Hazardous Materials

As stated previously, the current waste audit did not assess the contents of compacted and household trash. Based on the results of the UAACOG and studies conducted by the US EPA, however, we know that a large portion of municipal solid waste could be composted, recycled, or repurposed—up to 80% according to the UAACOG and as much as 95% according to EcoCycle. Unfortunately, we also know that some of what enters the landfill includes banned and hazardous material. The waste audit conducted by the UAACOG found hazardous waste in every single bag that was sampled, and suggested as much as 21% of municipal waste contains special (such as e-waste and textiles) and hazardous waste (see Figure 3).

A few examples of common hazardous waste include antifreeze, car wax, furniture polish, cleaning solvents, paint, varnish, and some glues. Many lawn fertilizers and pesticides are also hazardous waste, as are household batteries, electronics, prescription medications and over-the-counter pharmaceuticals, fluorescent light bulbs, and both nail polish and polish remover. These and other hazardous waste should never be put into Chaffee trash bins, because if they end up in the Chaffee Landfill, there's a risk of them eating away liners and leaching in to waterways. This includes the gold-medal trout waters of the Upper Arkansas River.

Results- Waste Diversion Rates

Chaffee County's Numeric Breakdown

To calculate the Waste Diversion Rate for Chaffee County, the total amount of materials recycled and composted was divided by the total amount of waste generated. Chaffee County's Diversion Rate was 8.1% in 2018, and 7.3% in 2019 (including tires, which are used as an alternative daily cover at the landfill, those numbers increase to 8.2% and 7.4%, respectively).

As a comparison, in 2018, Colorado generated 9,307,000 tons of waste, and 1,116,840 tons, or 12%, was diverted from the landfill. While Chaffee's county-wide diversion rate is lower than the state average, residents of Chaffee County actually generated less trash per person per day than the state average. On average, each Colorado resident throws away nearly 8 pounds of trash per day, whereas each resident of Chaffee County throws away only 6.5 pounds of trash per day. Even still, Coloradans send more waste to the landfill than the average US resident. The nation's average Diversion Rate is 35%, suggesting Colorado and Chaffee County have a lot of room for improvement.



Potential Diversion Rate

Since this 2020 waste audit did not assess the contents of compacted trash, household waste, loose trash, or construction waste sent to the landfill, it is impossible to determine the most accurate potential diversion rate. However, based on the data provided by the Chaffee County Landfill, some materials could easily be recycled or composted.

Items that Can Avoid Landfilling:

- In 2018, 1,020 tons of yard waste and dirt was discarded into the landfill, and in 2019, that number was 972 tons.
 - Yard waste and dirt can be used for agriculture purposes, as fill dirt, and to create compost—a valuable product that reduces the need for synthetic fertilizers, helps retain soil moisture (thereby reducing irrigation water needed), and increases the soil’s capacity to sequester carbon.
- Construction activities produced 1,407 tons of concrete waste in 2018, 1,578 tons in 2019, and nearly 4,000 tons in just the first quarter of 2020. The jump in 2020 may be due in part to tearing down the old high school in Buena Vista.
 - Concrete is easy to recycle and reuse and using recycled concrete has become increasingly common in development and construction activities. ACA Products in Buena Vista recycles clean concrete.
- Metal, tires, and mattresses are relatively easy to recycle, and recycling service providers for these materials exist in either the county and/or in Denver.

Not counting the amount of waste diverted already through recycling and composting services provided, in 2019, at least an additional 2,740 tons of material could have been diverted with relative ease.

Potential Diversion Rate

Based on the data collected for this project, if Chaffee County composted all yard waste and dirt from construction, then the diversion rate would have increased to 12% in 2018 and 11% in 2019. If Chaffee also recycled concrete (and no other construction materials), then the diversion rate would have increased further to 17.8% in 2018 and 17% in 2019.



Moreover, assuming the UAACOG samples of compacted trash are representative of the current composition of municipal solid waste in Chaffee, then almost 80% of the trash from that category could have been diverted from the landfill. Given that half of the trash sent to the landfill is compacted trash, recycling and composting in this category could drastically increase Chaffee's diversion rate.



Additional Diversion Items

In addition to the relatively “easy-to-recycle” materials discussed previously, other materials to consider include construction waste (non-concrete). Construction activities accounted for 6,444 tons of material entering the landfill in 2018, 6,788 tons in 2019, and 3,494 tons in the first quarter of 2020. Like concrete, many of the materials from construction activities could be recycled. For example, drywall (also known as plasterboard, wallboard, sheet rock, gypsum board, buster board, custard board, or gypsum panel) is made from gypsum and other additives. Since gypsum has so many uses (including making new drywall), it is relatively easy to recycle.

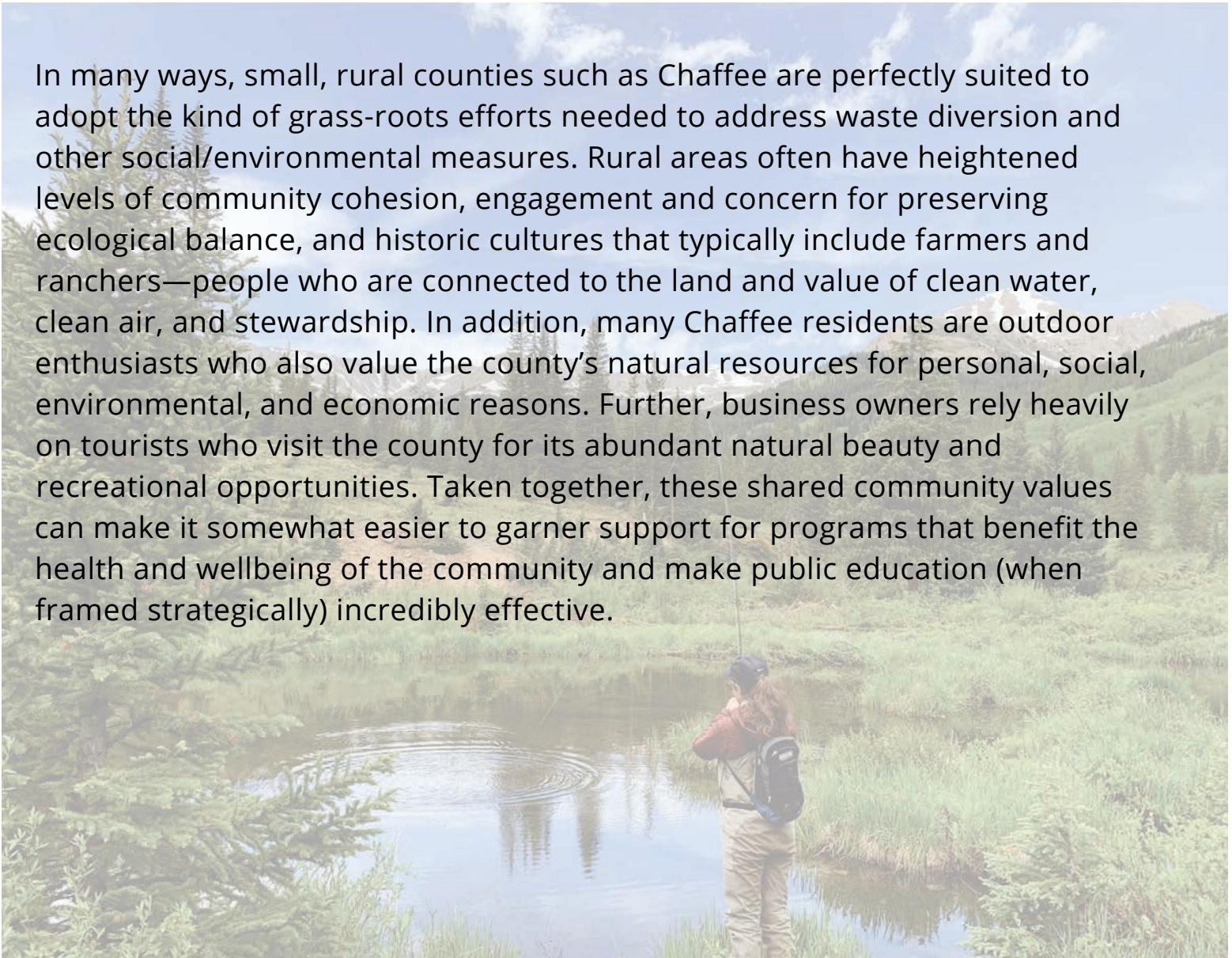


Some materials from construction activities have value that could make them easy to repurpose. Outdated kitchen cabinets, countertop materials, appliances in working condition, unbroken tiles, and wood, for instance, could be made available for free to residents, as is the case at the Eagle County landfill. It is important to note that the Drop N’ Swap program allows Eagle County landfill users to drop-off items in working/good condition, at the same fee as disposal, and the items can be picked up by anyone, including businesses. The program reduces the need for residents, especially disadvantaged community members, to purchase brand new materials, and reduces the amount of material flowing into the landfill.

Summary and Recommendations

The next few years will be crucial for putting Colorado on the path to creating a circular economy where more of the materials discarded are transformed into new products or composted into nutrient-rich soil. Achieving our state-wide 2021 goal of 28% waste diversion will be difficult, especially for rural counties such as Chaffee. Roughly half of Colorado's population (2018 = 5.96 million) lives outside the 10-county Denver/Front-Range Metropolitan Area (2018 = 2.93 million). Small counties, when added together, have the potential to make huge impacts.

In many ways, small, rural counties such as Chaffee are perfectly suited to adopt the kind of grass-roots efforts needed to address waste diversion and other social/environmental measures. Rural areas often have heightened levels of community cohesion, engagement and concern for preserving ecological balance, and historic cultures that typically include farmers and ranchers—people who are connected to the land and value of clean water, clean air, and stewardship. In addition, many Chaffee residents are outdoor enthusiasts who also value the county's natural resources for personal, social, environmental, and economic reasons. Further, business owners rely heavily on tourists who visit the county for its abundant natural beauty and recreational opportunities. Taken together, these shared community values can make it somewhat easier to garner support for programs that benefit the health and wellbeing of the community and make public education (when framed strategically) incredibly effective.

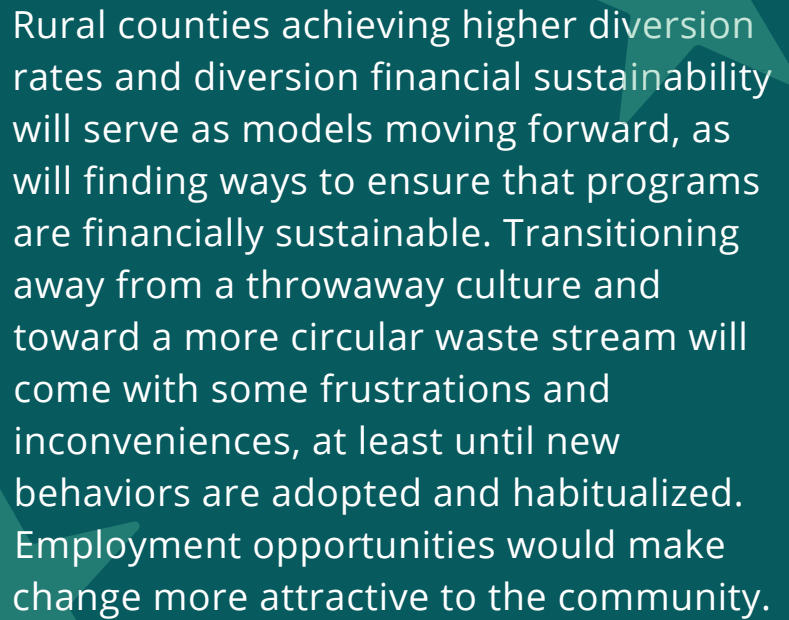


Summary- Rural Diversion Challenges

Increasing diversion rates in rural areas can also be more challenging than in urban areas, and Colorado's mountain and rural communities face several disadvantages.

Chaffee County Diversion Challenges:

- transportation costs due to long travel distances to viable markets
- lower material generation requires long-term storage and space until load requirements for shipping are met
- less funding due to a lower tax base
- low population density that makes curbside collection programs challenging and costly



Rural counties achieving higher diversion rates and diversion financial sustainability will serve as models moving forward, as will finding ways to ensure that programs are financially sustainable. Transitioning away from a throwaway culture and toward a more circular waste stream will come with some frustrations and inconveniences, at least until new behaviors are adopted and habitualized. Employment opportunities would make change more attractive to the community.

In addition to differences in material measurement, there are also differences in frequency of measurement across the waste collection businesses. The landfill, for example, records data on a quarterly basis, whereas Angel of Shavano Recycling weighs materials when they are shipped, which may be weeks or months after they were generated and received.

Summary- Tourism Impacts

These differences make it difficult to determine how tourism and events, which primarily occur during summer months, impact the amount of waste generated in the county. More waste is generated as county populations increase, but by how much cannot be determined at this point.



Recommendations to Consider

1. Explore ways to divert compostable materials from the landfill

Most yard debris and construction dirt and green can easily be composted and turned into nutrient-rich soil. Making this single change would divert more than 2,000 tons from the landfill annually. Including food scraps will increase diversion rates substantially. While accurate data on the amount of food waste that enters the landfill in Chaffee County isn't currently available, the US Environmental Protection Agency reports that, 20% of what goes into municipal landfills is food. Providing curbside “green bins” would increase adoption of composting behavior by making it convenient for residents to divert their food scraps and yard debris. Four of the top five highest diverting cities in Colorado provide curbside composting or seasonal yard waste collection.

Based on meetings with Julie Mach, owner of Elements Mountain Composting, encouraging businesses, schools, and the Buena Vista Correctional Facility to participate in the composting program would be a significant next step toward reducing the amount of compostable material sent to the landfill. Currently, EMC does not operate at full capacity and could likely handle the increase in materials that these organizations would supply.



Recommendations to Consider

2. Consider the possibility of replicating Eagle County's Drop N' Swap Program

A dedicated area at the landfill is necessary to implement a construction material swap program. However, beyond that, the costs are nominal and the benefits are substantial. Users would be able to drop off items that still work, are in good condition, or can be re-used by someone else. All landfill disposal fees would still be applicable for dropped off items, helping to cover any costs of the program, but there would be no fee to pick up items. It is difficult to determine the impact this would have using the existing data; however, just 10% of construction and household waste adds up to 1,000 tons.

According to Jesse Masten, Solid Waste and Recycling Manager at the Eagle County Landfill, the Drop-N-Swap program has been effective at increasing their diversion rate at little to no cost. Specifically, they do not have an attendant at the site, but instead check with customers as they



cross the scales to determine whether they have material that would be acceptable for the Drop-N-Swap. Once directed to the site, which is located next to their scale house so attendants can visibly monitor it from there, visitors are asked to place materials neatly in the location. Material that does not get picked up by residents ends up in the landfill, which is why customers are charged a fee to drop material. Residents, businesses, and commercial developers are permitted to use the Drop-N-Swap area.

Recommendations to Consider

3. Increase participation in recycling programs by making curbside recycling mandatory

This would mean that bins must be offered as part of regular trash service. National studies show that bundling trash with curbside recycling is one of the most effective ways to increase participation and to collect more recyclable material per household. Small loads increase the cost of recycling programs because materials must be stored until it makes financial sense to ship them, so increased participation is necessary for successful rural recycling. Moreover, some companies require a predictable and large volume of materials. Increasing participation rates would require community outreach and education—something many of our local non-profits already do successfully. Partnering with local organizations and businesses could be part of a community-based social marketing approach.

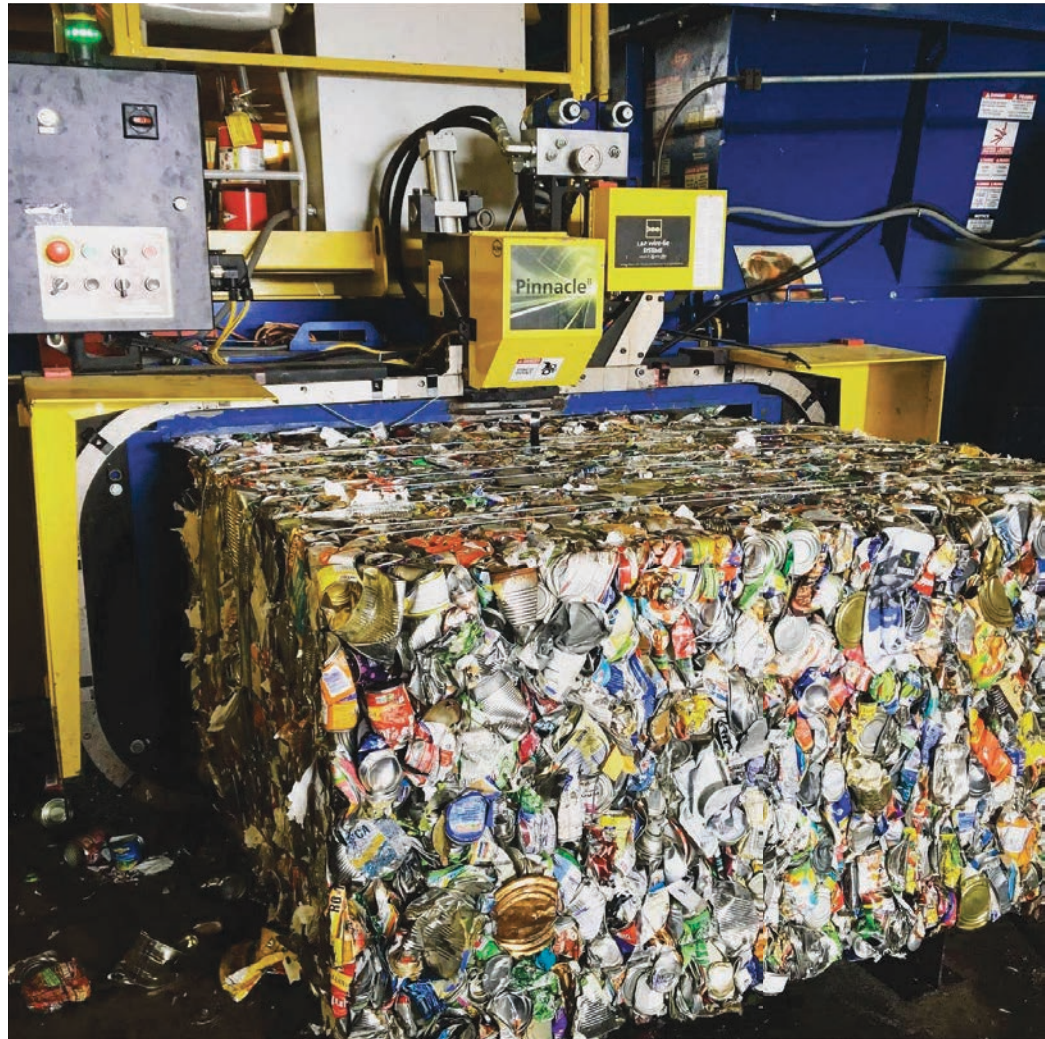


Recommendations to Consider

4. Explore ways to keep recyclable materials flowing within the local economy

Most materials collected for recycling in Chaffee County, and Colorado, are shipped out of state to be made into new products.

Until 2018, when China put a moratorium on imported recyclables, many of those materials were shipped out of the country. Local waste diversion solutions present an opportunity to attract new businesses to the county and state that will keep materials flowing within the local economy. The need for recycling isn't going away, and the recycling industry can provide job opportunities for Coloradans while also reducing the pollution (including greenhouse gases) caused by transporting materials out of state.



Recommendations to Consider

5. Create a Waste Diversion Plan for Chaffee County that sets realistic goals based on the needs of our community

Collaborate with GARNA and/or other organizations to conduct annual waste audits, create partnerships with waste-related businesses, and educate the community about waste diversion.



Conclusion



It is more important than ever for Colorado to strengthen its commitment to protect the health of its residents, its ecology, its economy, by building smart, sustainable communities. Waste diversion is a major part of that commitment—it is one of the fastest, easiest, and most cost-effective local solutions to reduce pollution and greenhouse gasses. It is accessible and simple—allowing community members to contribute to a better world each and every day. Moreover, recycling is the foundation of a circular economy. Creating value out of waste helps people, businesses, and the planet.

References

Cover Page Image: <https://www.mapsofworld.com/usa/states/colorado/counties/chaffee-county-map.html>

Page 3 Photo Credit: "At the landfill" by Redwin Law is licensed with CC BY 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by/2.0/>

Page 4 Photo Credit: "Waste Audit" by City of Fort Collins, CO is licensed with CC BY-NC-SA 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-sa/2.0/>

Page 8 Photo Credit: "Rubbish and recycling bins (trash cans) in New Zealand" by Wesley Fryer is licensed under CC BY-SA 2.0

Page 9 Photo Credit: <https://signsanddisplays.wordpress.com/>

Page 10 Photo Credit: <https://www.waste360.com/commercial/boulder-colo-increases-commercial-waste-diversion-rate>

Page 12 Photo Credit: "Yard waste divided" by Baha'i Views / Flitzy Phoebe is licensed with CC BY-NC-ND 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-nd/2.0/>

Page 12 Photo Credit: "The Rubble pile - Garden Rubble Project" by brewbooks is licensed with CC BY-SA 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-sa/2.0/>

Page 14 Photo Credit: Hayden Mellsop, GARNA Member

Page 16 Photo Credit: <https://www.colorado.com/cities-and-towns/salida>

Page 17 Photo Credit: ShareWaste uses digital mapping to connect individuals with leftover food scraps to nearby neighbors who have a composting system. GETTY IMAGES

Page 18 Photo Credit: Brian McCabe, https://www.themountainmail.com/news/image_b6e90090-5268-11ea-b0d0-4be5b9c0999f.html

Page 19 Photo Credit: "Republic Services Curbside Trash bins" by joncutrer is licensed with CC BY 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by/2.0/>

Page 1, 2, 21, 22 Photo Credit: Kelsey Kirkwood, GARNA Staff