Sustainable Peoria: Strategic Plan Updates & Program Funding

A Spring 2021
Collaborative Project with
Arizona State University's
Project Cities & the
City of Peoria

ASU Sustainable Cities Network
Arizona State University
Project Cities

PEORIA ARIZONA

Sustainability Action Plan 2.0

Renewing our Commitment to Peoria's Future

PART 1:

Project and community introduction

GET TO KNOW THE PROJECT

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EXECUTIVE SUMMARY

KEY STUDENT RECOMMENDATIONS

SUSTAINABLE DEVELOPMENT GOALS

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This report represents original work prepared for the City of Peoria by students participating in courses aligned with Arizona State University's Project Cities program. Findings, information, and recommendations are those of students and are not necessarily of Arizona State University. Student reports are not peer reviewed for statistical or computational accuracy, or comprehensively fact-checked, in the same fashion as academic journal articles. Editor's notes are provided throughout the report to highlight instances where Project Cities staff, ASU faculty, municipal staff, or any other reviewer felt the need to further clarify information or comment on student conclusions. Project partners should use care when using student reports as justification for future actions. Text and images contained in this report may not be used without permission from Project Cities.

Cover images:

City of Peoria
and Project Cities

ACKNOWLEDGMENTS

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On behalf of the Julie Ann Wrigley Global Futures Laboratory, the Global Institute of Sustainability and Innovation, and the School of Sustainability, we extend a heartfelt thank you to the City of Peoria for enthusiastically engaging with students and faculty throughout the semester. These projects provide valuable real-world experience for our students and we hope that their perspectives shine light on opportunities to continuously improve Peoria's future livelihood and community well-being.

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To access the original student reports, additional materials, and resources, visit:
links.asu.edu/PCPeoriaSustainabilityPlanning20-21

ABOUT PROJECT CITIES

The ASU Project Cities program uses an innovative, new approach to traditional university-community partnerships. Through a curated relationship over the course of an academic year, selected Community Partners work with Project Cities faculty and students to co-create strategies for better environmental, economic, and social balance in the places we call home. Students from multiple disciplines research difficult challenges chosen by the city and propose innovative sustainable solutions in consultation with city staff. This is a win-win partnership, which also allows students to reinforce classroom learning and practice professional skills in a real-world client-based project. Project Cities is a member of Educational Partnerships for Innovation in Communities Network (EPIC-N), a growing coalition of more than 35 educational institutions partnering with local government agencies across the United States and around the world.

ABOUT SUSTAINABLE CITIES NETWORK

Project Cities is a program of ASU's Sustainable Cities Network. This network was founded in 2008 to support communities in sharing knowledge and coordinating efforts to understand and solve sustainability problems. It is designed to foster partnerships, identify best practices, provide training and information, and connect ASU's research to front-line challenges facing local communities. Network members come from Arizona cities, towns, counties, and Native American communities, and cover a broad range of professional disciplines. Together, these members work to create a more sustainable region and state. In 2012, the network was awarded the Pacific Southwest Region's 2012 Green Government Award by the U.S. EPA for its efforts. For more information, visit *sustainablecities.asu.edu.*

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ASU Sustainable Cities Network
Arizona State University

Project Cities

Sustainability through local action

ABOUT PEORIA

Ranked as the No. 1 place to live in Arizona by Money Magazine, the City of Peoria is currently home to over 191,000 residents. The City enjoys a reputation as a family-oriented, active community with an exceptional quality of life. Peoria entertainment and recreational amenities include attractions such as Lake Pleasant, trails, and community parks.

The City has also demonstrated a strong commitment to sustainability, as evidenced by its incorporation of LEED building design standards, a council-adopted Sustainability Action Plan, and the "Green Team" staff dedicated to managing organization-wide sustainability initiatives.

PEORIA TEAM

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Peoria is the place
World class ▪ Sustainable ▪ Future Ready

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July 7, 2021

Dear Peoria community members,

It is with tremendous appreciation and excitement that we bring to your attention the results of the second year of our collaboration with ASU's Project Cities program. Although it was a very different kind of year than the first year of our collaboration, that did not dampen the energy of the students or the final results of their work. This partnership has provided the opportunity to work with faculty and students across several academic programs, benefitting from their insights, creativity, and diverse perspectives on a number of projects. Many of these entailed public participation, and you may have participated by completing a survey that was distributed in our community through a variety of platforms.

Project Cities is one of several partnerships we enjoy with ASU, and part of our ongoing strategy to engage with community partners to leverage our resources as we address the many issues that face us as a local government. With a modest investment in this program, we have received extensive research, recommendations, and deliverables that take several key initiatives to the next level for us. These include our efforts around water conservation, transit, recycling, and the possibilities around our Skunk Creek corridor in P83. By engaging students and faculty on these subjects, we have advanced our understanding and positions on each one much more quickly than we could have without their assistance.

The results provided on each project provide us with invaluable insights into many of our most important opportunities, and will position us to better serve our community. The city has already begun to incorporate the students' deliverables into next steps in advancing these projects. We look forward to continuing this work on additional projects in the coming year, and cherish our partnership with ASU and Project Cities.

Sincerely,

Cathy Carlat, Mayor

Jeff Tyne, City Manager

Peoria, Arizona

Proud partner of

ASU Sustainable Cities Network

Arizona State University

Project Cities

Rio Vista Recreation Center

Demographics

total population: **190,985**

median age: **35**

highly skilled and educated workforce of 85,252

11,997 veterans live in Peoria

78% of residents are homeowners

median property value: **$399,025**

33% of residents hold a Bachelor's degree or higher

median household income: **$79,700**

Schools

#3 of 131 Best School Districts for Athletes in Arizona

#5 of 40 Best School Districts in Phoenix Metro Area

#7 of 130 Best School Districts in Arizona

The Peoria Unified School District is one of the largest employers in the West Valley. The district consistently receives high ratings and offers signature programs such as the Career and Technical Education programs.

Peoria is also home to Huntington University, a liberal arts college offering digital media education in animation, broadcasting, film, graphic design and other digital media arts.

Leading industries

Peoria, Arizona is not just a scenic suburb of Phoenix, but also a thriving economic development hub with an educated workforce and high-end residential living. There are over 4,000 employers and more than 75,000 people employed within Peoria. Leading industries include health care and social assistance, retail trade, and finance and insurance. Highest-paying industries include utilities, manufacturing and public administration. Beyond these industries, Peoria works actively to attract businesses from aerospace and defense, film and digital media, technology and innovation, hospitality and tourism, and research and development. Peoria is the place for business owners, developers and investors.

Health Care & Social Work

10,905 employees

Retail Trade

10,628 employees

Finance & Insurance

6,574 employees

History

Founded in 1886 by Midwestern settlers, Peoria is nestled in the Salt River Valley and extends North into the foothills around Lake Pleasant. Beginning as a small agricultural town, the economy received a major boost when a railroad spur line was built along Grand Avenue. The construction of the Roosevelt Dam in 1910 secured a reliable water supply, attracting more settlers to the area and business endeavors to the town center. Peoria's economy continued to have an agricultural focus for decades. Continually growing, Peoria assumed city status in 1971 with a population of 4,792. It has since grown into a city with a population over 190,000, and is renowned for its high quality of life and recreational amenities.

Sustainability

Peoria has demonstrated leadership in municipal sustainability efforts through a wide range of actions. Listed below are some of the City's sustainability accomplishments.

- Incorporation of LEED building design standards
- Appointment of a full-time city staff member who manages and coordinates sustainability initiatives
- Sustainable urban planning practices including open space planning and water management principles
- Sustain and Gain: Facebook page and brochures keep residents up to date on city sustainability efforts and ways to get involved
- Water Conservation Program: free public classes, public outreach at city events, and water rebate incentives for residents
- Council-Adopted Sustainability Action Plan: this strategic planning document, in its second iteration, ensures city departments are developing sustainability-oriented goals, tracking success metrics, and encouraging cross-communication in the preparation of Sustainability Update presentations made to the Peoria City Council on an annual basis
- Sustainable University: courses and workshops to empower residents to make small changes that make Peoria a better place to live; topics covered include residential solar, gardening, composting and recycling

Awards and recognition

- Number One City to Live, Work and Play in 2021 *(Ranking Arizona)*
- Received three Crescordia awards by Arizona Forward at the annual Environmental Excellence Awards in 2016
- 12th City for Green Space in the U.S. in 2019 *(Wallethub)*
- Top 15 Safest Cities in the U.S. 2017-2019 *(Wallethub)*
- 6th Wealthiest ZIP Code in 2020 *(Phoenix Business Journal)*
- Top 50 Hottest Hoods in 2018 *(Phoenix Business Journal)*
- 10th Best City to Raise a Family in 2018 *(Wallethub)*
- Top 100 Golf Course in U.S. 2017-2019 *(Golf Digest)*

Lake Pleasant

1886 — Peoria founded by William J. Murphy

1889 — First school district formed

1919 — Chamber of Commerce organized

1954 — Peoria incorporated

1971 — Assumed city status with a population of 4,792

1977 — Brewers spring training begins at Greenway Sports Complex

1986 — Centennial celebration

1994 — Peoria Sports Complex opened

2007 — Theater for the Performing Arts and Rio Vista Recreation Center opened

2012 — 20-year extension spring training agreement with San Diego Padres and Seattle Mariners

2017 — Selected as site of new $70M health clinic for Maricopa County Integrated Health System

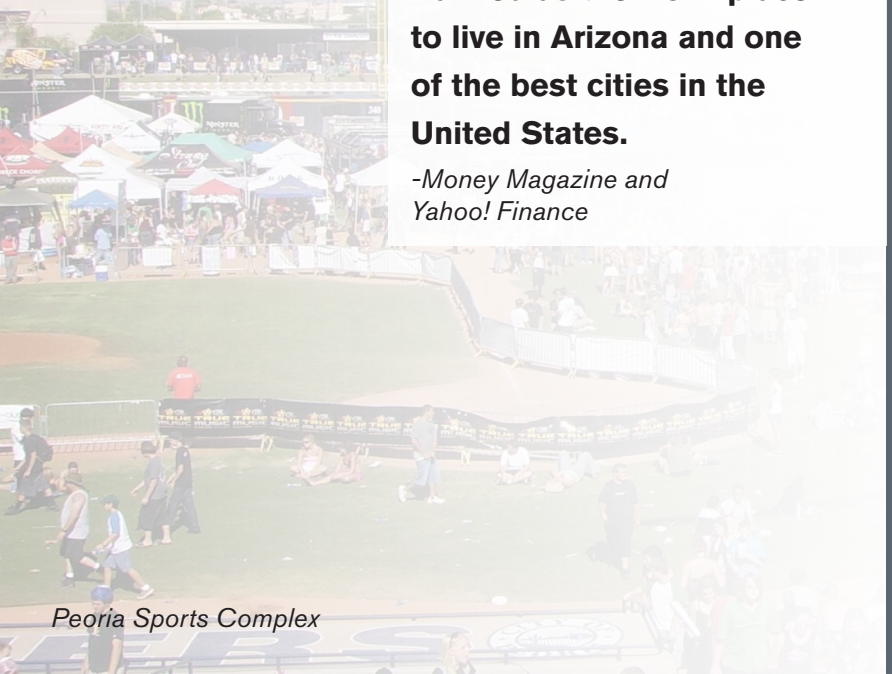
2020

Livability

Peoria is renowned as a great place to raise a family and start a career. A plethora of local amenities and attractions contribute to Peoria's livability. Beyond the tourist attractions of Spring Training and Lake Pleasant, the City offers many community facilities and recreational opportunities for all ages and interests such as an extensive public park system and annual community events. Peoria's dedication toward livability is also evident in the City's latest General Plan which addresses sustainable water use, housing, public services and more.

Ranked as the No. 1 place to live in Arizona and one of the best cities in the United States.

-Money Magazine and Yahoo! Finance



Peoria Sports Complex

Peoria strives to uphold these six major livability priorities in order to maintain an exceptional quality of life for its citizens.

- Arts, Cultural and Recreational Enrichment
- Economic Prosperity
- Smart Growth
- Superior Public Services
- Healthy Neighborhoods
- Integrated Transportation

Community Facilities

- Peoria Community Center
- Rio Vista Recreation Center
- Peoria Sports Complex
- Peoria Center for the Performing Arts
- 39 neighborhood parks
- 2 libraries
- 3 swimming pools
- 5 golf courses
- 9 lighted multi-purpose ball fields
- 15 tennis courts

Lake Pleasant

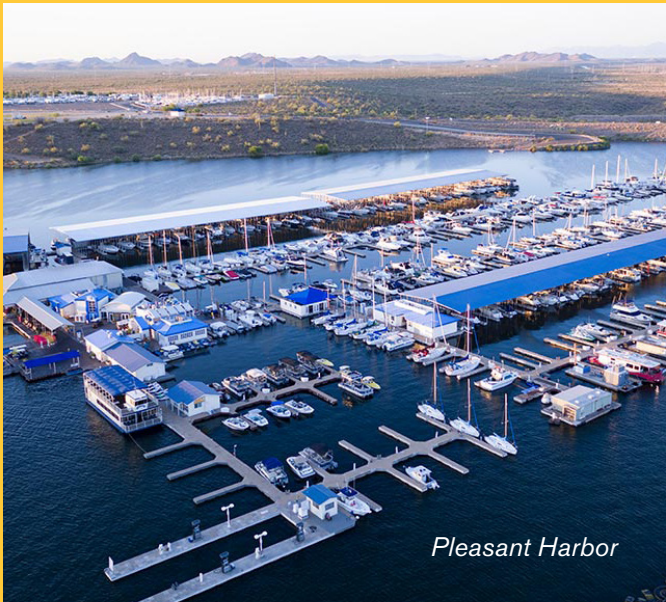
Urban ecology, ecotourism and recreation

Peoria is surrounded by the natural beauty of the Sonoran Desert and is home to Lake Pleasant, a 23,000-acre park and major recreational asset to the North Valley. The transient Agua Fria River and New River flow through Peoria, as do a multitude of washes and creeks. Most notable perhaps is Skunk Creek — known for the recreational trails running alongside it — which forges a connection between Peoria and Glendale. Northern Peoria is home to beautiful mountains and buttes including Sunrise Mountain, Calderwood Butte and Cholla Mountain.

Boasting over 300 days of sunshine annually, Peoria's ecotourism opportunities are a steady industry for residents and visitors. The City features over 60 miles of trails for walking, biking and horseback riding, as well as 570 total acres of accessible park land.

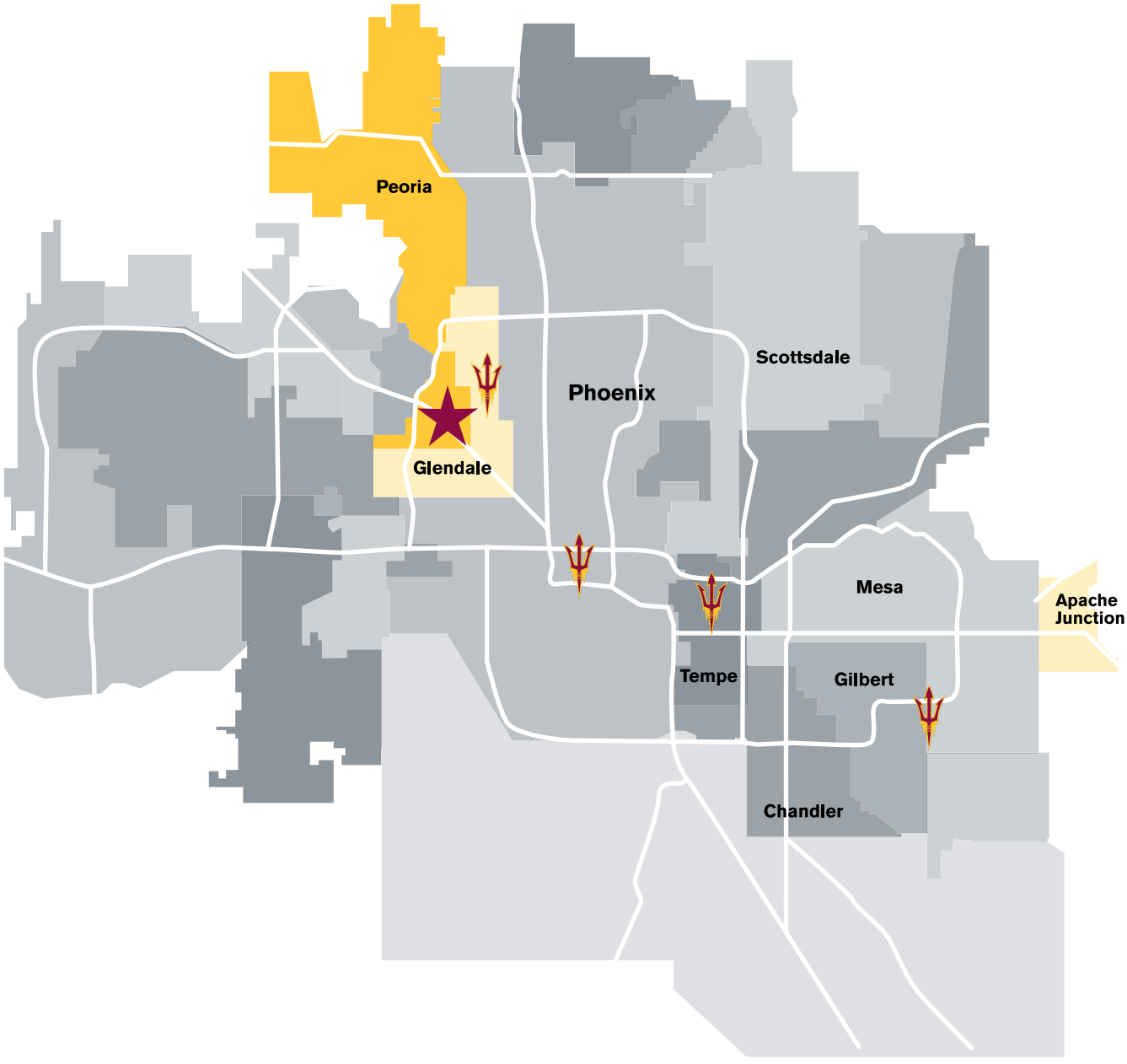
Lake Pleasant Regional Park contains a full-service marina, providing opportunities for water-oriented recreation such as kayaking, water skiing and even scuba diving. Visitors can also go horseback riding, take gliding lessons, hike, camp and more.

Skunk Creek



Pleasant Harbor

MAP OF PROJECT CITIES PARTNER COMMUNITIES IN THE GREATER PHOENIX METROPOLITAN AREA



Peoria City Hall

ASU campus

EXECUTIVE SUMMARY

Peoria continues to demonstrate its commitment to sustainable development with the Livability Initiatives, which is comprised of six overarching goals for the city, including Economic Prosperity, Superior Public Services, Integrated Transportation, Arts and Cultural Enrichment, Smart Growth, and Healthy Neighborhoods. In 2009, the City of Peoria released its first *Sustainability Action Plan* (*SAP*), a guiding framework and action plan to support the city's sustainable development. Since the first plan, the City of Peoria has continually revised its action plan, with the release of the *Sustainability Action Plan 2.0* (*SAP2*).

As the City prepares for its next revision, Peoria seeks to gather community input to inform and develop metrics to measure success towards the goals. In a partnership with two ASU courses, graduate students continued to research best practices for community input and developing key performance indicators (KPIs), as well as research funding opportunities to support sustainable development initiatives. Students developed recommendations for the *Sustainability Action Plan 3.0* (*SAP3*).

EMS 588: Graduate students in the School of Sustainability's Master of Sustainability Leadership (MSL) program conducted a series of listening sessions with Peoria residents, in addition to conducting a community Omnibus survey for their Capstone project. Four graduate students from Shirley-Ann Behravesh and Stephanie Pfirman's MSL Capstone course each focused on a method to collect community input. Students collected community input through the distribution of a sustainability focused Omnibus survey, listening sessions with residents, development of key performance indicators for the city's goals, and the development of a public outreach campaign.

PAF 509: Two graduate students from Malcolm Goggin's Public Affairs Capstone course each researched funding opportunities and strategies to support the City's sustainability efforts considering the development of the *SAP3* revision. One student reviewed funding strategies for the City's Water Services department, and the other researched opportunities for the City's Solid Waste division. For their final deliverable, students compiled potential grant opportunities, and recommendations for funding strategies.

The following student reports and recommendations are intended to provide the City of Peoria with strategies and best practices, as it moves forward with its *Sustainability Action Plan 3.0*. With the community survey and coinciding listening sessions, the Peoria community supports sustainable development for the community, with an emphasis on city-wide increased connectivity and shaded streets. Students recommend additional community feedback, with an emphasis on additional surveys for the plan, and hybrid listening sessions to gather additional feedback. As Peoria moves forward with its planning, students have also provided recommendations to seek out additional funding, using a variety of funding resources, including community grants and partnerships with other municipalities.

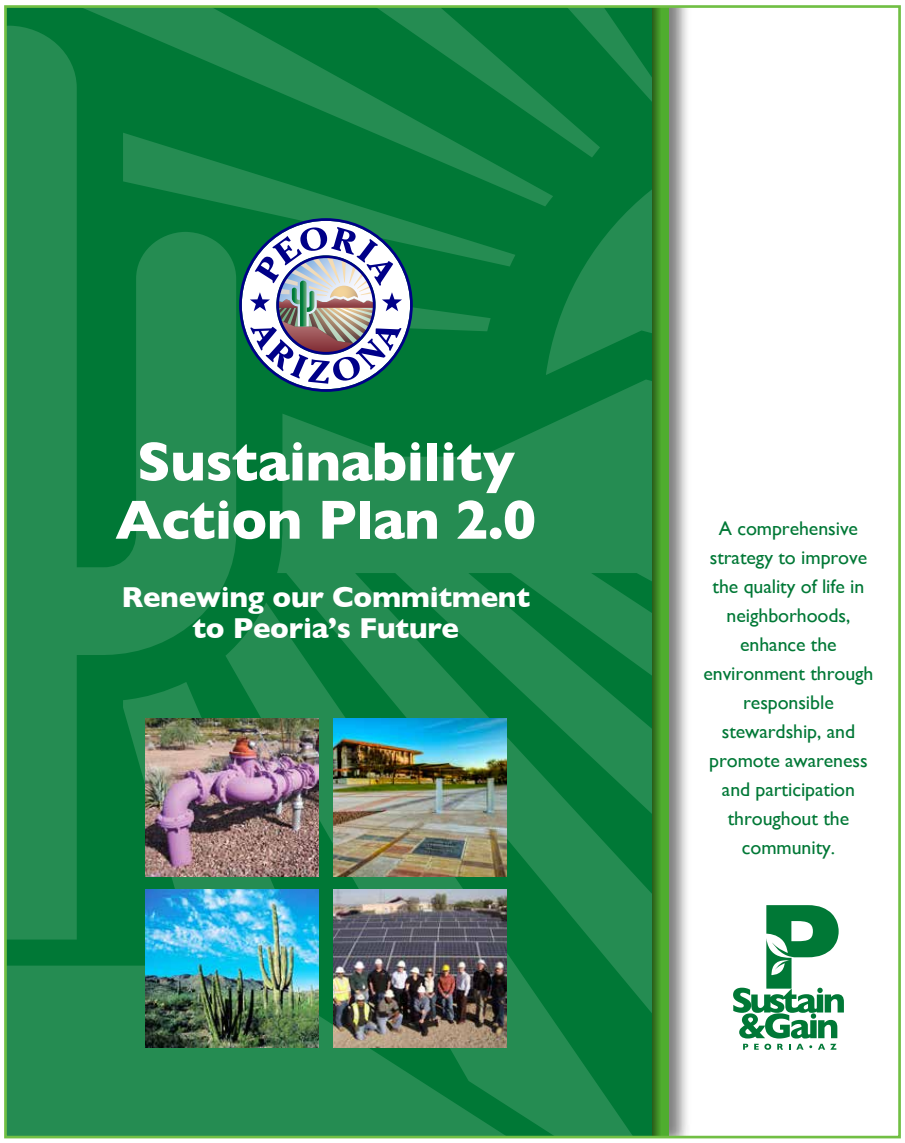


Figure 1 *City of Peoria Sustainability Action Plan 2.0, published in 2016*

KEY STUDENT RECOMMENDATIONS

Recommendations for sustainable future development	Read more
Increase alternative transit options and further develop transportation infrastructure.	pp.25-26, 33-40, 51
Strategize new development to ensure proximity to schools, services, and entertainment for ease of transportation, and greater walkability.	pp.34-35, 40, 51
Address community concerns such as safety of existing bike lanes and trails.	pp.35, 51
Pursue the electrification of the city fleet vehicles and its associated infrastructure, such as strategic charging stations.	pp.34-38, 51
Increase shade opportunities along trails, paths, and roadways to increase usability during high heat times and provide environmental benefits.	pp.37-39, 51

Recommendations for community education and engagement	Read more
Focus information dissemination efforts on digital modes, utilize new and effective social media trends like increasing video and image usage, and incorporating hashtags into messages.	pp.41-51
Provide incentives for surveys and other community engagement activities to increase participation, thus raising the value of collected data.	pp.43, 50-51
Develop a sustainability focused social media account to increase engagement with audiences that may not visit existing resources such as the city website.	pp.43-44, 51
Utilize micro-learning practices, such as reviewing important topics in shorter, more digestible videos, to target a larger audience and increase youth engagement for the Sustainable U program.	pp.25-26, 47-51
Pair virtual listening sessions with in-person listening sessions to reach a more engaged and focused group of participants.	pp.25-31, 39-40, 51

Recommendations for recycling program funding and engagement	Read more
Design a method of evaluating funding opportunities or programs that includes a sustainable approach into planning and decision-making, such as a funding matrix.	pp.87-89, 96
Enhance the recycling program by focusing on its largest group of stakeholders, the customers. Gathering feedback, improving the customer experience, and reporting results can all be useful tools to further engage residents in the practice as well as provide valuable information to the Solid Waste Department.	pp.93, 96
Leverage smart technologies and data gathering to plan for future Solid Waste Department developments. Online tools can help educate residents or optimize solid waste routes, while sensors can help monitor waste in high-traffic areas.	pp.93-94, 97

KEY STUDENT RECOMMENDATIONS

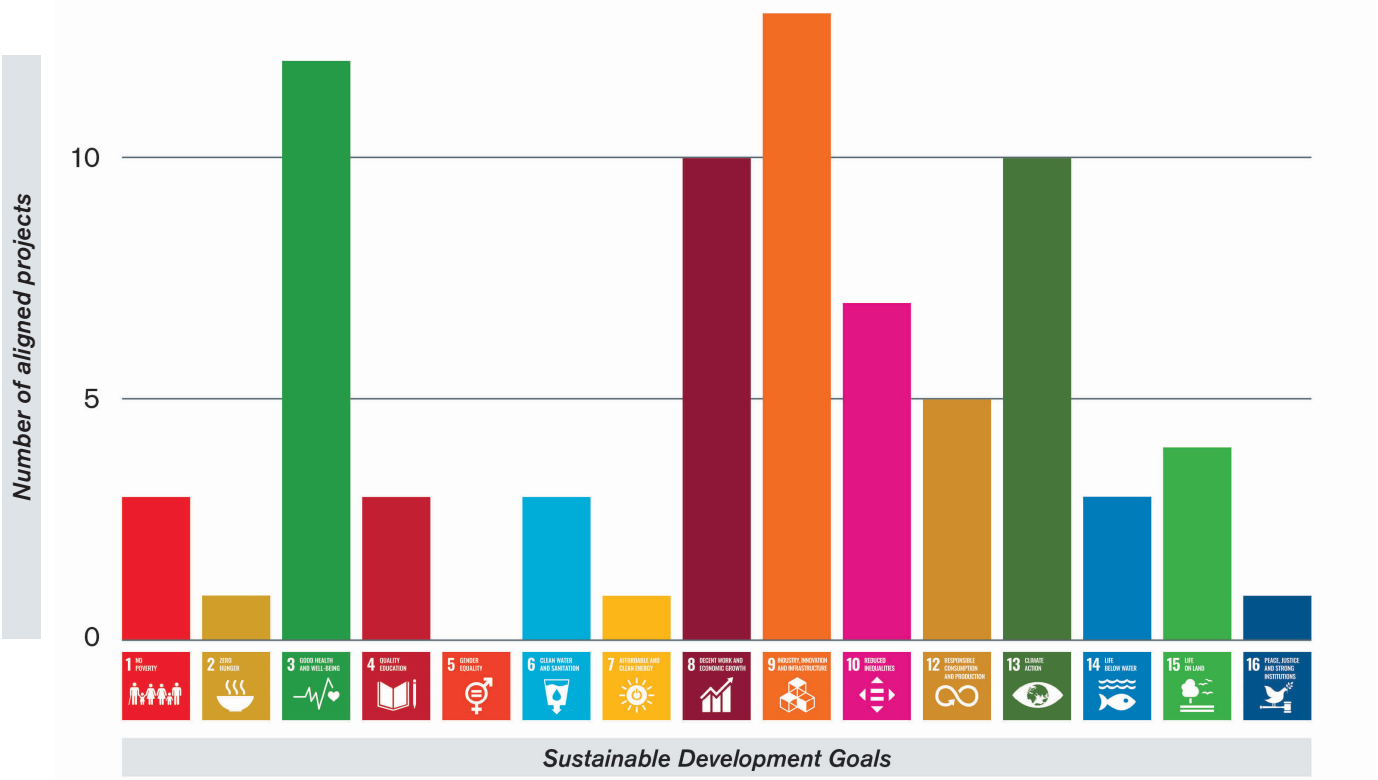
Recommendations for water conservation action and engagement	Read more
Consider expanding the existing rebate program, potentially utilizing grant funding to extend the capacity for offering rebates.	pp.71-74
Collaborate with local nonprofits, such as Watershed Management Group, the Nature Conservancy, or the Environmental Fund for Arizona, to seek more funding related to water conservation.	pp.71-72
Pursue public-private partnerships with local companies to augment pre-defined projects while also using funding from grant resources.	pp.64-65, 69-72, 74
Invest in advanced metering infrastructure renovations coupled with a self-service dashboard software, such as WaterSmart.	pp.69-72
Utilize water conservation technologies along with education and outreach to help residents better understand their water conservation. Data collected from these technologies can also be utilized to inform education materials on water reducing strategies.	pp.67-69, 71-73
Increase awareness of the PeoriaNOW email option by adding email registration messaging to the physical flyers currently included with Peoria water bills. For example, include text along the lines of "Contact news@peoriaaz.gov to sign up for the virtual newsletter" or "Have this news sent directly to your inbox by contacting news@peoriaaz.gov."	pp.71, 73
Host neighborhood pop-up events to educate residents on existing water conservation projects and initiatives.	pp.68, 70-71, 73
Coordinate closely with homeowners' associations to plan pop-up events that educate the community on water conservation initiatives, which could also lead to neighborhood conservation projects, such as turf replacement or xeriscape gardens.	pp.68, 73-74
Utilize social media to further communicate City water conservation efforts, as well as encourage sign-ups for the Sustainable U series.	pp.68, 71, 73
Consider adding an additional "Water Conservation Specialist" staff position. Functions of this position can include grant writing, expansion and management of the rebate program, coordination of capital projects related to water conservation, communication with local businesses on public-private partnerships, and assistance with the new Water Conservation Kit program.	p.74

CITY OF PEORIA PROJECTS: ALIGNMENT WITH THE UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOALS

As the leading international framework for sustainable decision-making, the 17 Sustainable Development Goals (SDGs) lay out a path for partnerships toward global peace and prosperity. The SDGs provide a set of goals and metrics for project impact to be measured, offering an illustration of the benefits experienced by the cities, towns, and students who participate in a Project Cities partnership. For details on the SDGs, visit **sdgs.un.org/goals.**

Every project in the PC program aligns with SDGs 11 and 17.

The figure below illustrates SDG project alignment throughout the City of Peoria's partnership with Project Cities, through the Spring 2021 semester.



TOP THREE GOALS ADDRESSED IN THE FOLLOWING REPORT

The capstone projects presented in this report address strategies for Peoria to continue strengthening its commitment to sustainability. Students address *Sustainability Action Plan* updates, as well as additional funding opportunities that support recycling and water conservation efforts. Projects specifically touch on SDGs 4, 11, and 13.

Goal 4: Quality Education

"Ensure inclusive and equitable education and promote lifelong learning opportunities for all."

Continuing to support and grow educational opportunities such as Sustainable University contributes to widespread community awareness of sustainability issues.

Goal 11: Sustainable Cities and Communities

"Make cities and human settlements inclusive, safe, resilient and sustainable."

Updating the *Sustainability Action Plan* in a regular fashion helps ensure local endeavors continue to support and achieve important sustainability goals.

Goal 13: Climate Action

"Take urgent action to combat climate change and its impacts."

Increased funding for sustainability efforts and community education can help conserve water, divert waste from landfills, and encourage daily sustainable choices throughout the community.

The following report summarizes and draws highlights from work and research conducted by graduate students in EMS 589 MSL Capstone Prep, and EMS 588 MSL Capstone, for the Fall 2020 and Spring 2021 partnership between ASU's Project Cities and the City of Peoria.

To access the original student reports, additional materials, and resources, visit:

links.asu.edu/PCPeoriaSustainabilityPlanning20-21

ASU Sustainable Cities Network
Arizona State University

Project Cities

Sustainability through local action

PART 2:

Informing Sustainability Planning Through Community Input

OUTREACH AND ANALYSIS FOR MUNICIPAL SUSTAINABILITY PRIORITIES AND COMMUNITY ENGAGEMENT

EMS 588: MASTER OF SUSTAINABILITY CAPSTONE

SCHOOL OF SUSTAINABILITY

FACULTY
SHIRLEY-ANN BEHRAVESH AND
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INTRODUCTION

Leadership teams, including the Mayor, have recognized the need for a renewed approach to their sustainability plan. A sustainability action plan is a roadmap for achieving long-term goals, documents strategies, tracking key performance indicators, and providing transparency with your community or target audience. Sustainability action plans have become increasingly important for cities worldwide to create and implement. These plans assist cities in becoming more sustainable and establish a system of accountability to uphold "green" goals. The goal is to include resident feedback and create an environment where citizens are granted the space to ask questions, be educated, and provide feedback on procedures already in place.

Peoria's goal is to create a safe, enjoyable, and sustainable community by focusing on its Six Livability Initiatives set by city leadership. In 2009, Peoria wrote its first *Sustainability Action Plan* (*SAP*). The revised *SAP*'s goal is to improve neighborhood quality, enhance community awareness and economic health, and leave positive impacts on the local environment.

Editor's Note
The City of Peoria has developed six overarching goals, also known as the Livability Initiatives, to guide priorities and goal setting for the City.

Figure 1 *City of Peoria Livability Initiatives*

The original action plan is now almost a decade old and much has changed. For consideration, Peoria, a suburb of Phoenix, Arizona, is now part of the fastest growing metropolitan area in the United States (Richardson, 2019). The city has grown by over 25,000 new residents (U.S., 2019; World, 2021). Rapid growth, like that in Phoenix and surrounding communities, places tremendous burden on metropolitan operations and the environment. Especially considering that Peoria, located in the Sonoran Desert, is home to some of the highest temperatures in the United States (Richardson, 2019). To remain resilient in the face of extremes, it is imperative for the community to revamp the old action plan to account for more people, changing cultures, different circumstances, and to better mitigate the effects of the changing climate.

Editor's Note

This is not the first time that Peoria has worked to bring the best amenities to the city and meet the expectations of the city's growth. In 2004, Peoria partnered with the Performance Based Studies Research Group to assist in the planning of expected city growth. "In an attempt to efficiently meet the demands of the projected growth, the City of Peoria partnered with the Performance Based Studies Research Group out of Arizona State University in 2004" (Sullivan & Carey, 2010).

In an interview with Lisa Estrada, former Sustainability Manager for Peoria, Arizona and current Community and Sustainability Programs Manager at the City of Anaheim, she discussed how the plan had been a beneficial stepping-stone in the process of sustainable change within the community and an inspiration to many other communities in the area. In many places, due to political pressures and cultural norms, this could have been more difficult to initiate but in the desert, water conservation has always taken precedence with wide support, no matter the political beliefs. By concentrating on water, efficiency, and cost savings (Estrada, 2020), Peoria was able to bring sustainability to the forefront in city operations. In creating the first *SAP*, they were able to set a "vision of the future" for all Peoria residents, increasing their quality of life and resiliency (Estrada, 2020).

Peoria had recognized the need for strategic planning and goals to keep driving its sustainability mission forward in a meaningful way to allow them to stay resilient in the face of change. The City aims to develop a new sustainability action plan created with public input and quantifiable data (Caster, 2020). To create a new plan with citizen support, Peoria seeks direct public input on primary citizen concerns. Each resident perspective is considered important and adds depth and viability to the action plan.

The *SAP3* will be based on research and data collected from the previous year. In September 2020, students were granted the opportunity to work with the City of Peoria in their efforts to create a dissemination plan and resident survey. The goals of this survey and educational outreach plan were to educate the public in the upcoming sustainability efforts that were taking place, but to also gain insight to objectives that citizens would like to see instilled in their city when it comes to sustainability initiatives and policies. The main focal point of this revision is engaging with Peoria's residents.

City leaders are looking to gain insight on the desires and expectations of Peoria's residents through survey methods and community listening sessions. With these methods, the goal is to improve on multiple sustainability focal points throughout the community. Sectors of focus include health and wellness, community education, transportation, waste management, water management, **urban form**, community forestry, and building energy. By using these various sectors to track sustainability, Peoria can transform its current sustainability plan to a new and improved plan that includes transformative strategies and technologies.

Editor's Note

Urban form refers to the physical characteristics of built areas. Scales of urban form can be the shape, size, and density of physical characteristics. Common elements of urban form include streets, buildings, and blocks.

Project management tools

The City of Peoria cares deeply for its residents and the well-being of its community. The purpose of this type of structured revision plan was to not only gain feedback but also to keep an open line of communication for residents to understand and comprehend the *Sustainability Action Plan 3.0* (*SAP3*). Students utilized project management tools to guide their project structure, and to structure the Omnibus survey and listening sessions.

Editor's Note

One goal from this project was to ensure all residents felt heard and involved. It was crucial to include a Spanish version of the survey, as it is the second leading language in Peoria. It was very important to city leadership to provide an option for residents whose primary language is Spanish to also participate.

Project management is an important aspect of any project. With so many moving parts things can easily be forgotten or overlooked. Particularly when creating a sustainability action plan, many areas are dependent on the success of another, and therefore allocating enough time and resources to each area is important.

Editor's Note
Kotter's 8-Step model is a process for initiating change within an organization. Kotter outlines eight steps that can guide an organization through the process of change.

The Kotter's 8-Step Change Model

Sustainable change requires a great level of buy-in from the target audience. When trying to grow a city sustainably the level of buy-in from the residents is of the utmost importance. It is necessary to create a plan outlining how to influence the residents to become change agents of sustainable change based on their varying levels of knowledge. To garner the high level of participation and support needed it is best to use John Kotter's 8-Step Change Model. This is a fantastic framework for implementing change powerfully and successfully. The following paragraphs outline each step of the model.

Step one: Create a sense of urgency.

Change requires buy-in from those within an organization or community. Developing a sense of urgency around the need for change is fundamental in a successful plan. This will hopefully spark the initial momentum to get the ball rolling. For the project with the City of Peoria, this step was done internally amongst the Conservation Department and the City Council. The Conservation Department presented the need for a revised *SAP* to the City Council members in which they agreed, "Kotter suggests that for change to be successful, 75 percent of a company's management needs to 'buy into' the change. In other words, you must work hard on Step 1, and spend significant time and energy building urgency before moving on to the next steps." (Mind Tools, n.d.). Preparation is key for long-term sustainable success.

Step two: Form a powerful coalition.

Sustainability is not a one-person job. It requires the support of a strong team with each member bringing something different to the table. A good mix of people from diverse backgrounds will be more beneficial to any project. In this case, the project team was assembled by two ASU Professors and the City of Peoria Water Conservation and Sustainability Coordinator Victoria Caster. The team consists of four MSL students and Victoria with the assistance of other municipal departments such as the Communication and Marketing teams. Each team member brings a unique set of skills and strengths to the project. Identifying those traits early allows for work to be distributed efficiently and effectively.

Step three: Create a vision for change.

This vital step in the process defines the project. Creating a clear vision helps everyone understand the primary goals and values that are essential to the project. Peoria's vision was established early on and has guided the project and allowed the student team to develop key steps toward executing the vision. In this case, steps included researching ways into which other Cities tapped into their residents' sustainability ideas and needs. It was established that the best way to do this was by creating and distributing a sustainability survey that would address key sustainability topics with residents.

Editor's Note
Students attribute the lack of listening session attendance to timing and virtual exhaustion due to COVID-19.

Step four: Communicating the vision.

In this phase, students begin by connecting with the residents of Peoria to share the established project vision. Students chose to communicate the established vision through hosting the four virtual listening sessions in January of 2021. Virtual listening sessions, however, are not the ideal way to connect with the residents as you lose in-person interaction which is difficult to replicate virtually. However, being able to adapt and be flexible is paramount in any plan. Each listening session was centered around two key sustainability topics that were referenced in the survey, allowing 30 minutes for each topic. During this time, a city expert on the topic would briefly describe what the topic meant. This helped the residents ask better questions and understand the survey in more detail. Overall, the listening sessions served as a great opportunity for the student team to talk with residents and share the project vision. It also provided a platform for people to address their concerns, ideas, and feedback.

Step five: Remove obstacles.

Buy-in from everyone is not possible, so in this step, students identified existing barriers and how to overcome them. Barriers were identified during virtual listening sessions by noting perceived resistance to change. Thankfully, city experts speaking at each session helped provide clarification and insight into topics that sparked any concern or doubts.

Step 6: Create short-term wins.

Multiple short-term targets, as opposed to one long-term goal, provides much-needed motivation for team members and participants. Showcasing quick wins is vital to maintaining project momentum. Quick wins in this project include attendance data from listening sessions and completion rate of surveys. Future wins include approval of the *SAP3* and communication to residents on the development and trackability of KPIs.

Step seven: Build on the change.

"Kotter argues that many change projects fail because victory is declared too early. Real change runs deep. Quick wins are only the beginning of...long-term change" (Mind Tools, n.d.). Step eight can be tough to implement, but this project provides building blocks for Peoria to embed sustainability in its operations. One next step could be providing the *SAP3* to other cities to act as a sustainability initiatives blueprint.

Step eight: Anchor the changes in corporate culture.

Sustainable projects do not end, rather they lead to other projects. Making the change stick within Peoria will come down to implementation of the *SAP3* and discussing the progress of initiatives on a local and national scale. Anchoring change will also require making plans to replace key figures within the team as they move on. Step eight is ongoing and should be monitored regularly to ensure long-term success.

SWOT analysis

A SWOT analysis (strengths, weaknesses, opportunities, and threats) helps assess internal and external factors of a project or situation. A SWOT analysis "helps you make smart, informed business decisions" (Kuligowski, 2020). The important thing to remember with any project, is things are constantly changing, and projects should be reassessed periodically by creating a new SWOT analysis every few months.

Sustainability input analysis project SWOT table

Strengths	***Weaknesses***
Promote sustainable behavior amongst residents. Develop unused land using sustainable practices. Promotes growth of local businesses. Creates cohesiveness between residents and local government, where residents feel valued. Ability to collaborate with other departments.	Many unknowns about the project, relies heavily on public participation. Sustainability can be a new concept for many people, receiving actional input may be difficult. Working in a remote team with members across different time zones can be challenging.
Opportunities (external)	***Threats (internal)***
SAP3 can serve as a template for other cities looking to revise or create a similar document. Plan can lead to long lasting sustainability projects. Increase local employment and decrease commutes.	COVID-19 pandemic slowing down project timeline. Residents not completing survey or attending listening sessions. City Council not approving completed action plan.

Figure 2 *Student developed SWOT diagram laying out project strengths and weaknesses*

Work breakdown structure

A work breakdown structure (WBS) chart is a great way to divide and conquer large projects or tasks so you can be more efficient and avoid overlooking any areas of the project. “Work breakdown structure is a hierarchical tree structure that outlines your project and breaks it down into smaller, more manageable portions” (Wrike, n.d.).

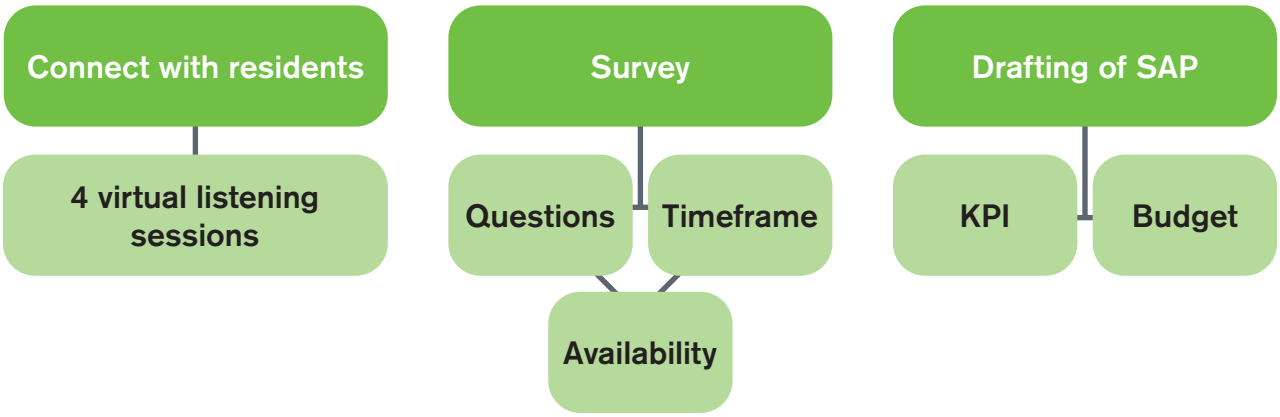

Figure 3 *Excerpt from student work breakdown structure*

Gantt chart

A Gantt chart is a visual view of project tasks spanning the length of the project. On the left of the chart is a list of tasks and along the top is a time scale. Each task is represented by a bar; the position and length of the bar reflect the start date, duration, and end date of the task. Gantt charts can be very valuable tools in project management and team coordination. The example chart below illustrates planned task timelines according to the sustainability project planning team. Charts should be considered estimates and events and timelines are subject to change.

Example project Gantt chart for sustainability input project

Week	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***
Assign project duties									
Construct survey questions and edit									
Share survey with Peoria residents									
Host virtual listening sessions									
Gain resident feedback									
Data analysis									
Implement relevant takeaways									

Figure 4 *Student developed project Gantt chart outline task schedule*

RESEARCH METHODS

Peoria's leadership teams have worked to bring sustainable objectives and opportunities to residents and community members. This project's overall objective is to conduct a professional and informational research study that helps city leaders drive future sustainability measures and initiatives to implementation. The City aims to be transparent with residents and community members on sustainable progress, therefore a revised plan should be driven by key performance indicators (KPIs) and actionable information.

Students designed and delivered a survey and hosted community listening sessions to inform and deliver a matrix rating the six livability goals established by city leadership. The matrix ranks the livability goals based on the survey results. This matrix would help determine the current state of Peoria's sustainability achievements and where they need to focus more in other departments.

Students first researched survey best practices, which led to the creation of short, easy to understand questions on sustainability topics, such as transportation and community forestry. Survey and listening session results were analyzed and mapped with two key takeaways:

1. Peoria residents preferred digital communication methods, which corroborated with preliminary research findings.
2. Peoria residents support further sustainability actions led by the City.

Finalizing the overall project included taking steps to help Peoria continue public outreach endeavors to further sustainable change. These efforts took the form of a lesson plan framework and instructional video on a sustainability topic, food waste, with the intent being able to showcase a streamlined and optimized format. This was done by utilizing micro-learning concepts and social media trends for better public engagement with young adults and teenagers across multiple platforms through the city-initiated Sustainable U program.

Omnibus survey

To prompt the most public response, Peoria offered a public sustainability survey to correspond with the city-led community “listening sessions." The survey and events aligned with pre-decided topics to better focus their sustainability efforts. Those include transportation, waste management, community forestry, health and wellness, water resources, building and energy, community engagement and education, and urban form (Caster, 2020). With a purpose decided and clear categories, the student project team formulated survey questions in collaboration with Peoria’s communications team. The question rubric included consideration of public knowledge, relevance to the project goals, and prioritization in near future municipal decisions (Bloomberg Cities, 2019) regarding *SAP3*. The survey questions included multiple choice and open-ended response options. It was important to Peoria that the survey include questions which allowed residents the opportunity to write in their thoughts on all the categories and sectors being discussed. After multiple rounds of edits, the survey was finalized with 47 questions.

Listening sessions

While formatting the right questions is vital, equally important is the choice of platform used to host the survey and listening sessions. Society is swiftly transitioning to increased usage of digital platforms (Salked, 2020) and the COVID-19 pandemic played a tremendous part in reducing in-person gatherings. Therefore, it was decided that these events and surveys would be hosted online. Digital-only platforms during a pandemic are safer than in-person, but people can experience “Zoom fatigue” due to the “excessive use of video-conferencing” (Bailensen, 2021). In contrast, digital options for attendance can open participation to those who normally would not physically be able to attend an event or might not fill out a paper survey. The original goal was to distribute the survey to the public before finishing the listening sessions in order to direct participants to the survey as well as keep project momentum moving forward.

However, due to the revision process, the survey was not published until after listening sessions took place throughout the month of January 2021. Listening sessions took place every Wednesday in January 2021 and were broken down into two categories per session. City representatives were on hand at each session to help answer questions and discuss the various categories, providing an open platform for residents and stakeholders to ask questions and voice their opinions. Unfortunately, the listening sessions did not attract many residents or community members.

FINDINGS AND ANALYSIS

Virtual listening sessions

Target audience

The target audience for the Virtual Town Hall listening sessions were the residents of Peoria. These listening sessions were focused around supporting Peoria residents and hearing the opportunities they see and ideas they wish to happen in the future for their communities. For each listening session, an associate from the City of Peoria was available to answer questions. City staff assisted with a smooth flow throughout the session and gave the residents the answers they needed to feel confident with the implementation of the newly developed *SAP3*.

Listening session 1: Community health and wellness, and natural systems and forestry

As this was the first listening session and first time connecting with residents, students and staff allowed additional time for residents to join before introducing the topics. The discussion of community health and wellness was a prominent topic considering the issues caused by the COVID-19 pandemic. The discussion highlighted the crucial need for support services. During this extraordinary time, ensuring the community has access to mental and physical healthcare services is essential going forward. Moving into natural systems & forestry, the discussion of shade was a hot topic. Creating shade throughout the city is a desire, especially being in a desert landscape. It was then discovered that Peoria features approximately a 6% coverage of shade trees, compared to 25% in Arizona cities further north. It was made clear that residents want to ensure adequate shade is available, particularly in community parks and recreation areas.

Editor's Note

The reported discrepancy in shade canopies is likely due to climate differences between central and northern Arizona cities. The City of Phoenix, however, has a goal of 25% shade canopy by 2030, so this level could be considered attainable in Peoria as well.

Listening session 2: Urban form and transportation

In session two, residents had many questions regarding development of roads and additional bus routes being added for convenience. With the city growing rapidly, quadrupling in size since 2008, this was one of the biggest transportation concerns. Peoria has a specific team working to keep up road and infrastructure developments and what that may require. This team helps ensure the city has controlled and flowing routes, particularly during high traffic times. Within the topic of urban form, there were concerns regarding walkability, transit, and counteracting urban heat. There are also many concerns regarding preservation of the desert environment surrounding Peoria for future residents.

Listening session 3: Waste management and water resources

During session three there was a lot of concern regarding Peoria's recycling program. City officials expressed the issues they are directly dealing with, such as cross contamination in recycling bins. Residents appeared very concerned about local businesses reducing their own cross contamination. They also expressed much interest in compost bins and discussed the local program available where the residents can receive a free 90-gallon compost bin. When the topic of water resources was raised, residents were very concerned by the drought conditions Arizona has been facing for decades. Residents were also informed that Lake Pleasant does not directly supply Peoria with water.

Listening session 4: Building and energy, and Community engagement and education

In the final listening session, residents tackled building and energy head on by starting off the conversation regarding Peoria's solar panels and how they were purchased. The residents wanted to ensure the panels were purchased in the most sustainable way possible. Finding out they were purchased with renewable energy bonds was an answer that appeased them. There were also concerns expressed regarding the water flow within city facilities as well as the temperature kept within the buildings, especially when most facilities were empty due to social distancing requirements of the pandemic. Residents were informed that when buildings were empty due to the pandemic, the HVAC systems were opened to maximize airflow. When it came to community education and engagement, residents expressed a desire for a more active community, like hosting family-friendly events and programs to bring the community together. City officials discussed the programs that are currently available, as well as the farmers markets that are hosted and where information is handed out to inform residents of future events.

Community omnibus survey

The survey launched on January 15th, 2021 and concluded on March 15th, 2021. During these months, students gained incredible feedback and data from respondents, including write-in responses. Each section of questions was formatted to have at least one write-in question. These open-ended questions, while extremely valuable, posed a hurdle when formatting the data and translating it for Peoria. With answers ranging between 519-780 words, students had to develop a strategic way to format the responses in an easy to read and digestible manner. The result was a word cloud image for each write-in response that was composed of 20-30 key words from the submissions. Students filtered out unrelated responses so they could focus on keywords that benefited the City and met final result expectations. Figure 5 shows an example of one write-in question's responses which were transformed into a word cloud to better represent the point and display the data in an easy-to-understand format.

Figure 5 *Write-in survey response summary word cloud*

The survey had a total of 780 responses which surpassed the participation goal by 144%. From the 780 responses, about 519 people completed the survey. Of the 519 people, 446 people opted in for the gift card giveaway incentive. As students reflected on the strategies that worked well, they realized the incentive was necessary to target such a large group of people.

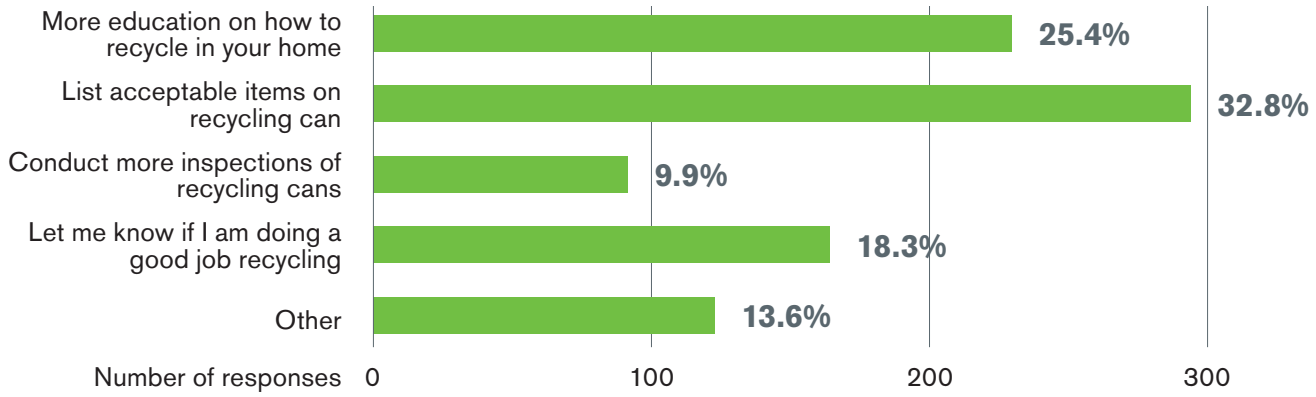

Figure 6 *Recycling incentives*
"Is there anything the City could do differently which would result in you starting to recycle or recycle more? (Mark all that apply)"

Livability goals matrix

Peoria's six livability goals are vital steps to community enrichment and vibrancy which the City strives to achieve through its municipal decision-making. The students' livability matrix aims to rate and track the livability goals and their progress as new policies and initiatives are introduced. As demonstrated in Figure 7, the matrix can help guide city leaders and individual departments in their efforts to continue growing a more sustainable Peoria. The livability goals were created to ensure quality of life expectations were still being met or exceeded as new policies, procedures, structures, and amenities are introduced.

The livability goals include:

- Arts, Culture, & Recreational Centers
- Healthy Neighborhoods
- Superior Public Services
- Smart Growth
- Integrated Transportation
- Economic Prosperity

Livability goals matrix						
	Peoria livability goals					
Analyzed focus sectors	Arts, Culture, and Recreational Centers	Healthy Neighborhoods	Superior Public Services	Smart Growth	Integrated Transportation	Economic Prosperity
Transportation	3	3	3	3	2	2
Natural systems and community forestry	3	3	1	1	2	2
Community health and wellness	1	4	3	3	4	2
Waste management	1	3	4	3	3	4

Matrix key
1-Not integrated at all
2-Somewhat integrated
3-Sometimes integrated
4-Mostly integrated
5-Always integrated

Figure 7 *Peoria livability goals matrix, based on Omnibus survey responses*

To help Peoria interpret survey results for maximum usability, the public outreach team created a set of recommendations based on the public's responses. Those recommendations were then compared to Peoria's six livability goals. Recommendations are encompassed through two sustainability topics: transportation, and natural systems/ community forestry. Survey respondents were asked for individualized input on questions like, "What do you believe to be the next big leap in transportation technology and travel related emission reduction for the City of Peoria?" and "What do you feel are important actions for the ongoing health and growth of natural ecosystems and community forestry in Peoria?". These types of open-ended questions provoked a wide range of responses, from concern over safety of existing bike lanes to the desire for more electric vehicle charging stations. Determining a pattern consisted of grouping each answer with like responses which resulted in the emergence of the following key themes:

- Preservation of natural spaces
- Increasing alternative transportation options and infrastructure.
- Strategize development to ensure proximity to schools, services, shopping, entertainment, and outlying areas
- Safety of existing bike lanes and trails
- Incentive-driven sustainability efforts
- Electrifying the city fleet of vehicles

These themes helped determine recommendations for the City of Peoria, such as increasing walkability of neighborhoods by expanding walkways and trails and ensure proximity to services including shopping and schools. When comparing said recommendations to Peoria's six livability goals, they were found to fit in best with the goals of increasing neighborhood health and "smart growth" for development. Comparing the recommendations based on citizen input to the current goals of the city allows Peoria to pinpoint which goal the recommendation would help them reach which could then be incorporated into the new *SAP3*.

Key performance indicators

Key performance indicators (KPIs) are a powerful tool that measures how effectively an organization is achieving key objectives or goals. KPIs can evaluate success in reaching a desired targeted goal and can be useful to highlight quick wins. To effectively use KPIs, which can be implemented into any project, operation, goal, or task, it is important to first identify targets, leading indicators, and lagging indicators. Setting a target will determine the desired level of performance and what you are aiming to achieve. Leading indicators predict future success and are precursors of future success whereas lagging indicators measure past success. An example KPI may be measuring the number of trees planted in a community in the following year. The corresponding lagging indicator would be how many trees have been planted thus far, and the leading indicator could be a wide variety of things such as how many trees are in the budget. The target would be the total number of trees to plant.

"Good KPIs are critical in:

- Providing objective evidence of progress towards achieving the desired result
- Measure what is intended to be measured to help inform better decision making
- Offer a comparison that gauges the degree of performance over time

KPIs provide a focus for strategic and operational improvement, create an analytical basis for decision making and help focus attention on what matters most" (Strategy Management Group, 2020).

As more cities shift their focus to sustainability, they can see how powerful KPIs can be in sustainable success. For example, Glendale, California releases KPI fiscal report tracking its goals each quarter. KPIs can be used within any department to track virtually anything. Figure 8 shows tracking KPIs for the Maintenance Service Department. Looking at how many street trees are planted, there is an increase each quarter with a fiscal year (FY) increase of 75 trees (City of Glendale, 2020).

Sample KPI tracker

	FY 2018-19 quarterly results					
Performance indicator	***1st quarter***	***2nd quarter***	***3rd quarter***	***4th quarter***	***FY 2018-19 actual***	***FY 2017-18 actual***
Total square feet of potholes filled	3,481	3,196	3,627	5,075	15,379	8,897
Total square feet of sidewalks repaired	10,349	8,555	14,214	9,332	42,450	32,575
Street trees trimmed	3,905	2,733	3,730	11,013	21,381	9,829
Street trees planted	4	93	70	302	469	394
Number of storm drain catch basins cleaned	3,798	1,154	241	19	5,212	8,614
Storm drain catch basin inspections completed	1,586	1,264	318	194	3,362	9,836
Linear feet of sanitary sewer inspected (CCTV)	71,438	51,260	44,456	61,299	228,453	281,667

Figure 8 *Example KPI tracker from Glendale, California Maintenance Service Department, by City of Glendale, 2020*

For this project, two to three KPIs were created for each of the eight key sustainability plan categories. The categories include building and energy, urban form, transportation, waste management, community health and wellness, natural systems and community forestry, water resources, and community engagement and education. Each of these categories is incorporated into the revised *SAP* and therefore creating two to three measurable goals within each category will allow the City to demonstrate sustainability progress and add to community buy-in.

It was a requirement that each KPI fit within Peoria's livability goals. To develop KPIs for the City of Peoria, students focused heavily on KPIs being reported by surrounding cities and feedback from the 780 survey responses. The research component of KPIs was extremely important and could not be overlooked, as this would be Peoria's first time using KPIs within its sustainability action plan. Students focused on four major cities within Arizona that report sustainability focused KPIs: Scottsdale, Tempe, Phoenix, and Flagstaff. The student team went over each city's sustainability plan, tracking reported KPIs, how often they occurred, and commonality amongst the reports.

The most commonly reported KPIs were compared to Peoria's livability goals and the omnibus survey results to find the best KPIs to report for Peoria's needs. This part of the process proved to be the most difficult and time-consuming step. The biggest obstacle was a lack of data due to tracking issues, and minimal community surveys being conducted. Key performance indicators are data-driven, therefore the lack of access to basic data made the task of developing strong KPIs specific to Peoria rather challenging.

Focusing on building a foundation for sustainability became important during this phase of the project. For example, regarding urban form, the focus began adapting more toward the creation of green policies, leading to a final KPI of "adaptation of green policies that allow Peoria to grow sustainably." Under the category building and energy, instead of reporting how much power was generated from the 8 solar panels on the municipal building, Peoria can report on the total municipal building energy savings. As sustainability continues to grow in Peoria, the need for tracking data will become apparent and stronger KPIs can be developed. However, starting with the 18 suggested KPI foundations listed on the following page can provide Peoria a great starting place to build a strong and transparent relationship between the City and residents.

Suggested KPI foundations	
Topic	***KPI***
Building and energy	1. Municipal building energy saving of X% from previous year which equals $X 2. Achieve 80% on code compliance ▪ Baseline year 2019 ▪ Target: 80% by 20XX
Urban form	1. Total construction permits with sustainable design elements issued in FYXX ▪ Baseline year 2019 2. Adoption of green policies that allow Peoria to grow sustainably ▪ Summarize any new policies created
Transportation	1. X residents utilized Peoria transit, a X% increase/decrease from previous year 2. Total number of EV charging stations in Peoria
Waste management	1. Increase waste diversion to 35% by 2030 ▪ Baseline year 2012-2016 = diverted 23% of solid waste stream (56,960 tons) 2. Add X amount of recycling bins for community and list recyclable items on cans
Community health and wellness	1. Report year crime: X property crime, X violent crime ▪ Goal: crime below 2- or 3-year average ▪ Need: 2- or 3-year average for property and violent crime 2. Number of neighborhood programs and events offered and attendance in FYXX ▪ Baseline year 2019
Natural systems and community forestry	1. Achieve a citywide 10% tree and shade canopy by 20XX ▪ Baseline year 2019=6% 2. Total developed park acreage per X residents (suggested per 1,000)
Water resources	1. Report best management practices each year ▪ No base year need, but yearly data should show trends of conservation 2. X number of residents took part in water conservation rebate for homeowners that installed low-flow toilets, sprinkler timers, and/or xeriscaping ▪ Baseline year 2019
Community engagement and education	1. X students/children took part in Project Wet-Youth Education ▪ Baseline year 2019 2. X residents are receiving sustainability e-newsletter and Sustain & Gain publication ▪ Baseline year 2020
Note: "X" indicates a piece of the KPI that requires additional information to fill in than students were confident in determining	

Figure 9 *Student suggested KPI bases for Peoria to utilize in the SAP3*

Public outreach

For most communities, enacting sustainable change requires cooperation and action, not only from governing bodies and policy makers, but also from the public. This cooperation and communication between entities does not come naturally and must continuously be tended to and sought out. In the book, Community Resilience and Environmental Transitions, author Geoff Wilson expounds on the concept that "resilience is both an outcome and a process" and that the process is never ending (2012). The reasoning for this "continual process" is that the community itself is always evolving with changing perspectives and priorities. Due to community change, it is important for a municipality or other local change-makers to create and maintain connections with the people. This network not only steers that change in an informed direction but empowers each citizen's desire to drive change.

For a leader to help initiate change at a community level, one must be aware of the space or environment in which the community lies. Every locality has its own culture and people that dictate their environment. A person can be passionate and well-meaning about a cause but if they do not know the community you are in and understand its history, people, and culture, success might be very difficult. Getting to know a community is not impossible for an outsider, but there are hurdles.

Establishing connections in a new community can be problematic as the culture can be vastly different, politics are strange, and outsiders with questions may be regarded as suspicious. Given this, persistence and education are key, though success is never guaranteed. Even if a person is knowledgeable about their community, without community support or input, any efforts towards change are more likely to fail or to be met with outright resistance.

Dissemination strategy

To gain public participation in Peoria's outreach events, the public needed to be increasingly aware of the existing events and be inspired to attend. Dissemination of event information to the public is imperative for an event's success and requires strategic planning. To better understand how to develop a dissemination strategy, students looked to the World Health Organization which had provided a guide and template for strategy creation (Gyapong et. al., p.156, 2014). The first step required reviewing past efforts, as taking previous actions into consideration helps build a more effective communication strategy.

Building a communication strategy required research on the public to determine their needs (De Mesa, 2020), discovering how they communicate best, and how to empower them in sharing their perspective. Census information held answers to questions such as language spoken, average age, income level, and family size (U.S., 2019) (World, 2021). This information gave clues as to what communication strategies could be utilized to better reach the intended audience. For example, one zip code might have a large population of Spanish-speakers and the city would need to direct multilingual volunteers and translated material in that area to increase engagement (Tindle, 2011).

Outreach strategies

Editor's Note
Segmentation is the process of dividing a large market into smaller subsections based on needs.

In consideration of the citizens of Peoria, and with the understanding that their unique voices are important to the narrative of future sustainability action, students carefully mapped out average and/or unique characteristics of each zip code (Figure 10). They were then **segmented** into categories such as average age, family status, and language spoken at home. For each segmented group, students researched the most effective outreach methods and found that each district was more alike in needs than different. Digital communication was found to be the most common and most effective with almost all groups by far (Roque, 2018, Vogels, 2020) (Figure 11). This information helped focus most dissemination recommendations on digital modes. Some examples of this included utilizing new and effective social media trends like increasing image and video usage and incorporating hashtags into messages.

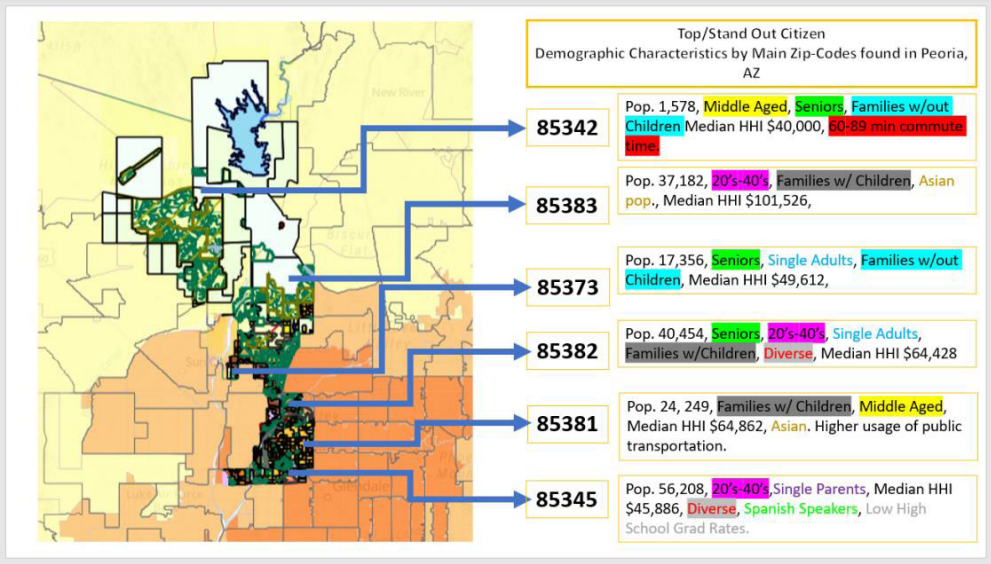

Figure 10 *Highlighted Peoria demographic characteristics by zip code*

Best communication modes by audience	
Audience group	***Communication modes***
Age 20-40	Social media, incentives, SMS, communications, school info, city app, digital media, influencers, peers
Middle aged	Social media, incentives, SMS, email, school info, digital media, traditional media, social/ cause groups, mail
Seniors	Social/cause groups, incentives, SMS, city webpage, mail, email, traditional media, digital media, social media
Single adults	Social media, incentives, SMS, city app, digital media, influencers, community events, social/ cause groups, peers, email
Families with children	Social media, incentives, SMS, digital media, school, email, social/cause groups
Single parents	Social media, incentives, SMS, digital media, school, email
Spanish speakers	Social media, incentives, digital media, traditional media, school, social/cause groups, mail, email

Figure 11 *Preferred mode of communication by segmented audience in Peoria*

The other most common outreach strategy proven to increase engagement across most categories of people is by offering an incentive (Tang, 2005). When considering possible incentive options, researchers asked a group of peers to describe what incentives interested them in past surveys. The best option was determined as being a simple monetary gift card. Sustainability Leader Alexandra Hill explained how this kind of general incentive can help gain the maximum number of diverse responses without accidentally encouraging biasness (Hill, 2020). Peoria agreed with this recommendation and instituted a sweepstakes style contest for respondents who finished the survey and provided an email address. This proved to be a successful strategy with 86% of people who finished the survey electing to enter the drawing.

Communication strategies

Once communication strategies were realized and events had started, it was imperative to keep up project momentum. Evaluation steps are vital to understanding if the right people were reached and if the correct message was being transmitted. If problems are found, the question of "What can be changed in order to alleviate the problem?" needs to be asked to improve disseminated information then and in the future. To better organize this step, students created an "impact log" for outreach documentation. This log allowed them to notate methods used for publicity and track interactions (Figure 12).

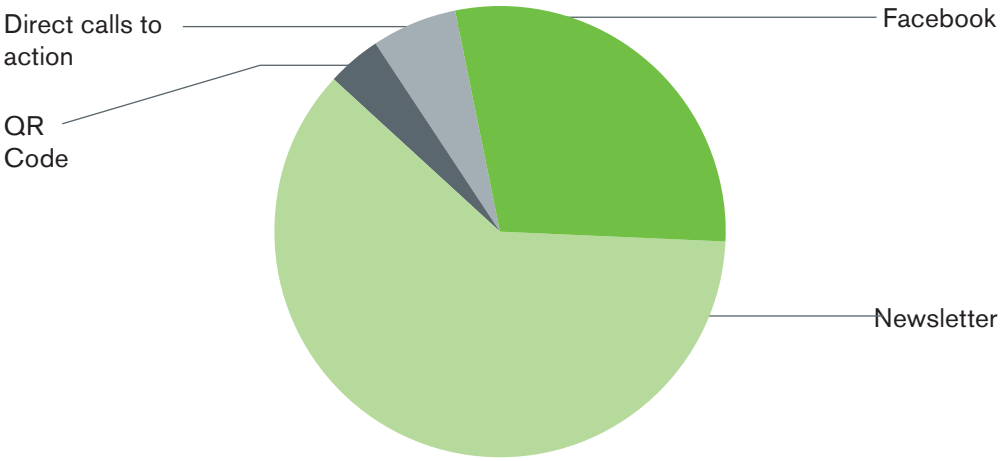

Figure 12 *Impact log outreach totals*

This was especially helpful for social media strategies. When evaluating social media content, it is important to look at how the social media platform was used, how many people interacted with the post, and if the call to action was realized. For research purposes, students found that social media allows specific points of personal interactions to be gauged which is helpful in evaluation. With this data assembled, students discovered the effectiveness of various social media posts put out by the City of Peoria regarding the sustainability survey and events. This prompted an adjustment of the dissemination strategy for city outreach with the recommendation of creating a separate sustainability-focused social media account so that posts were not lost in the unrelated content shared by the official account for the City of Peoria. The full dissemination strategy outline is available in the original student content appendix at **links.asu.edu/PCPeoriaSustainabilityPlanning20-21**.

Further evaluation efforts encompassed looking at the survey results as they came in. Sometimes, communication strategies do not have the intended reach. This information could be reflected in survey results. As survey results started to come in, it was important to evaluate them quickly so immediate action could be taken to minimize sampling errors. By including zip codes for self-identification, researchers could be more aware of the responding demographics. This information allows clarity in understanding where, how, and who are being reached with the chosen communication strategies. Mid-survey, with around 400 respondents, students noticed that most people were from one zip code. To avoid one-sided survey results, direct calls to action were sent out to numerous agencies and groups around Peoria. These groups were representative of the potential missing demographics. All voices and input are important, and students wanted to ensure every citizen had opportunity to contribute.

The City of Peoria also continued to reach out to citizens through social media, newsletters, flyers, and on their website. The results of the survey initially included a large number of respondents from one zip code but responses from other zip codes did increase after combined efforts. This input still gives a good representation of concerns and feedback from those areas. This information could be helpful to the City of Peoria in future outreach efforts by strategizing marketing efforts to under-represented areas.

Cultivating connection: Sustainable U

The City of Peoria has raised the bar in community sustainability by developing and promoting the Sustainable University, or Sustainable U, for residents. Sustainable U provides online courses that help the community practice sustainability efforts in their everyday lives and increase their knowledge of sustainability issues. Peoria's Sustainable U offers courses and workshops focused on landscape watering and design, energy efficiency, residential solar, gardening, recycling, and a variety of other topics (Lombardo, 2020). By familiarizing themselves with these topics, the residents can further understand the categories covered throughout the omnibus survey and listening sessions with Peoria's **Green Team**.

Editor's Note
The City of Peoria established the Sustainability Green Team to facilitate and coordinate interdepartmental collaboration to develop sustainability goals and success metrics.

Outreach is a bridge of communication, and that communication must be tended and cultivated to stay relevant and vibrant. Offering a public survey and hosting listening sessions have been very helpful in maintaining that communication bridge, but continuing outreach efforts are important. Looking at survey results, it became clear that the citizens of Peoria want more opportunities for sustainability education, and they want more engagement through digital platforms. The City of Peoria already had an amazing educational outreach program titled Sustainable U which offered workshops and informative videos to help citizens understand how to incorporate sustainability into their homes and communities. Current and past workshop topics have spanned from teaching people about native plant life and sustainable landscaping techniques, to instruction on proper recycling (Peoria, 2021). Through research on past workshops and videos, an opportunity presented itself to strategize audiences and optimize Sustainable U learning modules to increase citizen engagement and keep outreach pathways open. To better show the opportunity for change within the Sustainable U program, one student decided to create an example lesson plan framework.

Spine-tacular Cactus

January 15 - Saturday at 9 a.m.

Rio Vista Rec Center - 8866 W. Thunderbird Rd.

Cactus are uniquely suited to our desert climate and they are coveted by collectors all over the globe for their distinct and unique character. There are a few varieties that give you the most bang for your buck including beautiful flowers, amazing form, and easy to care for. Join us and find out more about these superstars, including selection, care, and even propagation.

Spring Vegetable Gardening

February 19 - Saturday at 9 a.m.

Rio Vista Rec Center - 8866 W. Thunderbird Rd.

Nothing is tastier than a fresh meal made from homegrown vegetables. Learn what plants do the best here and some gardening dos and don'ts for Arizona that will help your plants thrive and provide this spring.

Tour the Desert Fusion Garden

March 12 - Saturday at 9 a.m.

Fusion Xeriscape Garden - 8401 W. Monroe Ave.

Come take a tour of the Peoria Fusion Demonstration Garden with city staff as we talk about the benefits of xeriscaping and show examples of design and desert plant selection.

The Best Small Desert Trees

March 26 - Saturday at 9 a.m.

Rio Vista Rec Center - 8866 W. Thunderbird Rd.

How big of a tree do you need? A tree that is too big for it's location will eventually lead to the damage of surrounding sidewalks, neighbor disputes, and eventually the huge cost of removal. In this class a certified arborist will go over small to moderate tree options that work with our climate including photos, pros, cons, and tips on special care.

Wildlife Friendly Landscapes

April 9 - Saturday at 9 a.m.

Rio Vista Rec Center - 8866 W. Thunderbird Rd.

Now more than ever our native wildlife needs help to continue to thrive in our urban areas. You can help by turning your yard into a mini wildlife sanctuary! It's easy to create an inviting environment for birds, butterflies and other creatures using a wonderful array of native and desert adapted plants.

Recycling 101

April 16 - Saturday at 9 a.m.

Rio Vista Rec Center - 8866 W. Thunderbird Rd.

Do you ever look at the trash item in your hand and ask, can I recycle this? Recycling staff will walk you through what items are recycled in Peoria and what items have to stay in the trash. The more we can recycle right in Peoria the more waste we can divert from our landfills!

Resilient Landscapes

April 20 - Wednesday at 6 p.m.

Rio Vista Rec Center - 8866 W. Thunderbird Rd.

Is your landscape resilient to our regions extreme climate and low precipitation? A landscaping expert will walk you through the ways you can increase the resiliency and health of your landscape while still providing shade, color and an aesthetically pleasing view.

To register call 623-773-7137 or visit www.peoriaaz.gov/recplace and select the Adult Specialty classes.

Figure 13 *Sustainable U class flyer, by City of Peoria*

Audience

In the past, Sustainable U modules have been oriented towards all citizens. By being strategic and choosing an audience, a lesson or presentation can be tailored for them, using imagery and examples they relate to and learn from. When choosing an audience as the focus of my example lesson plan, the student was inspired by the insight offered from a Peoria public school teacher during one of the public listening sessions. When speaking about his class and their sustainability-focused projects, he had expressed his students' interest in sustainability, and he wanted to guide them in gaining a deeper understanding. He expressed that he saw a need for more city-led workshops and activities geared towards his students: high school-aged young adults (Peoria, 2021).

The student thought this was a great opportunity to build on to showcase a learning module with a specific audience, and began to research how teenagers learn best. According to research by Laurence Steinberg, 2015, their brains have greater capacity to learn (Conyers, Wilson, 2016) and they are social influencers with connection to the community. They enact change in their homes and are quick to adapt and engage with new information. To better understand what further public outreach through Sustainable U would look like with that specific age demographic, a SWOT analysis was completed to better prioritize steps and envision action (Figure 14).

SWOT table: Communication with teenagers

Strengths	***Weaknesses***
Established digital presence Capacity for learning Capacity for change Highly engageable	Time constraints Short attention span Potential low interest
Opportunities	***Threats***
Meet audience where they are Continue partnership with communities and schools	Time and resource constraints for leaders Keeping up with digital content trends Staying relevant and relatable

Figure 14 *SWOT analysis of adapting communications to teenagers*

Micro-learning

Getting to know the chosen audience and learning how to best interact with them led to researching concepts of micro-learning. Micro-learning "…enhances learning and performance in the most efficient and effective manner possible through short pieces of content" (Association for Talent Development, 2021). This means breaking down topics into more digestible content, which increases its efficacy. It is readily prevalent in popular social media platforms like Instagram, Snapchat, and Tik-Tok, which places a time and character constraint on all uploaded content. It is also used in job training when a large amount of information must be presented and absorbed in a short period of time (ATD, 2021). In fact, it is widely accepted in academia and elsewhere that having to memorize a large amount of information in a short period of time is difficult (Brame, 2016). Memory retention is thought to work better when topics are broken down into individualized sections, and attention spans are more receptive when the information being presented is focused and engaging (Brame, 2016). A 1999 study published in the Journal of Educational Psychology showed that "people learn and perform better when they can access short and engaging content at their speed, instead of vast complex information in one session (Shail, 2019).

Platform and learning objective

The teenagers of today are highly engageable through easy-to-access digital platforms (Roque, 2018; Salked, 2020). This information was heavily influential in choosing a topic and platform for an example Sustainable U module. As a sustainability leader and environmental activist, the student building the module knew there was a critical need for addressing food waste and there would be no better audience to start with than teenagers who are highly interested in food with the ability to make lasting sustainable change in their households and communities.

Because of the teenage audience, the food waste-focused lesson plan is heavily composed of micro-learning concepts and action opportunities that can be used both in-person and on digital platforms. This includes a short video meant to supplement the lecture and activities. Since the pandemic, all Sustainable U modules consist of video accessible through YouTube which is then shared across other social media platforms. Through research, the student noticed that the current format for Sustainable U videos is generally long-form which range between five and twenty minutes in length.

Taking into consideration best practices for engagement and education with the chosen audience, it was found that while the information provided in the long-form videos was interesting, young people might have a difficult time participating. This is due to perceived time and effort required to watch. If they did participate, they might have trouble remembering and applying the content (Brame, 2016). Research on making effective educational videos for teenagers shows "the maximum median engagement time for a video of any length was six minutes" (Brame, 2016). Also taken into consideration was social media trends to ensure accessibility and increase viewership across digital platforms. It was found that most shared videos should ideally be less than two minutes in length.

Sustainable U "Fast Track"

With the support of an experienced video producer, a food waste-focused micro-learning video was written and directed to help supplement the existing learning module and act as an example for future Sustainable U productions. The final video is under two minutes in length and uses a vertical orientation geared towards viewership from a smartphone device. The video focuses on food waste relating to expiration or best by dates on labels and features steps that can be taken to make change. Strategies for making change include preserving food and a reminder that composting is an option for some foods instead of being thrown away. Reinforcing this information in a lecture and activity can increase memory retention and subsequent action.

Figure 15 *Screenshots from student created micro-learning video (left) and lecture video, available at* **https://www.dropbox.com/sh/aklpzfg5mrm8utf/AADXXv8PEy-6aBD_HUbijtRua?dl=0**

In addition to the video, a presentation outline was also created utilizing micro-learning strategies that allow users to complete content at their own pace. It can be used within a school or other public setting and outlines “How to Minimize Food Waste and Why” including activity tutorials. These can be used in-person or through digital modes. Action-oriented activities range from conducting a live food waste audit at public events, to a cooking demonstration utilizing leftover produce. Hands-on or visual activities reinforce the ideas presented in the video and module as a whole and contribute to further action and connection by the learner.

Incentives

The omnibus survey results determined that while most respondents embrace and approve of further sustainability action, they need incentives to inspire them to participate. Increasing education to strategic audiences by utilizing micro-learning concepts and sharing that information across social media will help increase engagement but offering an incentive could further efforts. Since an incentive not only worked in increasing public participation with the survey, but was also a recurring theme in survey results, the students recommended the advent of an earned certificate for completing Sustainable U workshops. Offering the opportunity to earn a certificate provides a tangible way to acknowledge the time and effort spent by citizens to increase local sustainability knowledge. In addition, it will also empower the individual to be more engaged and encouraged to pass that knowledge on into the community. Earning a certificate also allows the citizen to receive community-wide acknowledgment and accolades, which influences others. This can enforce the ideal of sustainability as a positive change for all involved and could encourage deeper participation in the community.

Figure 16 *Sample certificate to award Sustainable U workshop attendees*

RECOMMENDATIONS

The following recommendations are based on student findings from the omnibus survey, listening sessions, and public outreach research.

- Increase alternative transportation options and further develop transportation infrastructure.
- Strategize new development to ensure proximity to schools, services, shopping, and entertainment for ease of transportation, increase in walkability, and stronger community connectivity.
- Address community concerns such as ensuring safety of existing bike lanes and trails.
- Pursue the electrification of the city fleet vehicles and its associated infrastructure, such as strategic charging stations.
- Focus information dissemination efforts on digital modes, utilize new and effective social media trends like increasing video and image usage, and incorporating hashtags into messages.
- Provide incentives for surveys and other community engagement activities to increase participation, thus raising the value of collected data.
- Develop a sustainability-focused social media account to increase engagement and awareness with audiences that may not visit existing resources such as the city website.
- Increase shade opportunities along trails, paths, and roadways to increase usability during high heat times and provide environmental benefits.
- Utilize micro-learning practices, such as recapping important topics in shorter, more digestible videos, to target a larger audience and increase youth engagement for the Sustainable U program.
- Pair virtual listening sessions with in-person listening sessions to reach a more engaged and focused group of participants.

CONCLUSION

Sustainability action plans are imperative for cities to maintain balance between social, economic, and environmental issues. A sustainability action plan is important for Peoria because it allows a city to manage growth and its subsequent economic benefits without compromising the city's charm, natural spaces, and environmental amenities. Continuing to revise the Peoria *Sustainability Action Plan* on a regular basis helps account for a changing population, economy, and environment.

By following John Kotter's 8 step model and developing strong key performance indicators, anyone can create the framework for how to initiate change, create buy-in, and ensure long-lasting sustainable success. Referring to the model allows for adjustments, measurements of success, and new opportunities.

By keeping an open channel of communication with its citizens, Peoria can gain the input and support necessary to continue driving sustainable change in its community. Seeking out connections through strategic outreach and creating platforms for those perspectives to be heard is vital. Through the survey and public listening sessions, Peoria was able to forge communication pathways and use them to create strategic goals. Those goals will be accomplished together as a community and will help the City of Peoria and its citizens to continue moving towards their commitment of "seek[ing] to reduce the city's effect on the environment, conserve energy, and encourage citizens to meet their needs without compromising the needs of the future" (Peoria, 2021).

Peoria can take the information collected from the survey and have open listening sessions for the residents to attend, both to educate residents and to allow city leaders to engage with residents. These listening sessions can be broken down into the various categories designed and chosen as the highest importance by the residents and city leaders. Overall, the improvements and categories are crucial to the advancement and betterment of the sustainability objectives set in place by Peoria.

The last and most important aspect of this project is making sure the community listening session's momentum is not lost. Making these sessions accessible and engaging is also very important. Using consistent categories that will directly impact the community members will bring long-lasting results and feedback for many years to come to Peoria and the surrounding communities.

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To access the original student reports, additional materials, and resources, visit:

links.asu.edu/PCPeoriaSustainabilityPlanning20-21

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The following report summarizes and draws highlights from work and research conducted by graduate student Sarah Purdy in PAF 509 Public Affairs Capstone, for the Spring 2021 partnership between ASU's Project Cities and the City of Peoria.

To access the original student reports, additional materials, and resources, visit:

links.asu.edu/PCPeoriaSustainabilityPlanning20-21

ASU Sustainable Cities Network
Arizona State University

Project Cities

Sustainability through local action

PART 3:

Water Conservation Strategies and Funding in Peoria

SUPPORTING WATER CONSERVATION GOALS THROUGH INFRASTRUCTURE ADVANCEMENT AND MUNICIPAL POLICY

PAF 509: PUBLIC AFFAIRS CAPSTONE

SCHOOL OF SUSTAINABILITY

FACULTY
MALCOLM GOGGIN AND
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INTRODUCTION

Located in the Sonoran Desert, the City of Peoria is responsible for its natural environment and citizens to be a steward of sustainable actions and education. In order to provide the highest quality of sustainable services for its citizens, Peoria requires clear tactics and consistent funding. The purpose of this project is to develop a set of recommendations for funding strategies for sustainability initiatives focused on those related to water conservation. The final deliverable for this project is a matrix of recommendations, including an overview, broad-view sustainability financing opportunities, funding strategies specific to water conservation, guidance for community education and outreach, and a discussion of current policy and implementation considerations. The research questions addressed through this project include:

1. What are successful sustainability strategies that have been used by other local governments in arid regions? How can these strategies be extrapolated to address the unique functions and needs of water conservation and citizen education/outreach?
2. How do different funding strategies impact the effectiveness and longevity of sustainability initiatives in local government?

With sustainability at the forefront of Peoria's priorities, the City seeks recommendations for funding opportunities and strategies to supplement the funding needed to create a more sustainable future. Peoria's water conservation efforts are modestly funded through **water enterprise funds**, meaning that each year the Water Services Department competes for funding with other departments that are part of the enterprise fund recipients, such as wastewater, solid waste, and sports complex operations and maintenance. This report evaluates funding strategies for sustainability initiatives at the local government level with a focus on water conservation and a set of recommendations for funding opportunities and strategies with which to apply funding practically.

Editor's Note
Enterprise funds are a separate accounting system for revenues and expenditures that are separate from other governmental activities.

The synthesis of existing research will aid in identifying key stakeholders, policy considerations, and previous funding practices related to local government water conservation and sustainability efforts. The findings discussed in the literature review will be used to augment the research team's understanding of policy considerations and practical approaches to research and the implementation of survey methods.

RESEARCH METHODS

Students collected qualitative data to address the previously stated research questions and aid in developing recommendations for funding opportunities through the utilization of survey software, such as Microsoft Forms or an equivalent program, and virtual interviews conducted via Zoom. The qualitative data collected is then organized based on policy considerations and key performance indicators relevant to accessing the practicality of funding opportunities for sustainability initiatives, with special attention to water conservation. After an initial review of the responses, common themes will be identified to guide the creation of the recommendations outline. Next, the overall dataset is reviewed to identify avenues for specific research on relevant grant opportunities, public-private partnerships, alteration of municipal practices, and other funding strategies, which leads directly into creating the final recommendation matrix.

Interviews with other Arizona municipalities and Peoria representatives

Primary data collection methods include surveys and interviews because of the strength of qualitative information in the context of finding practical funding opportunities and assessing and interpreting effective citizen education and outreach procedures. City staff recommended having only a few highly focused questions to retain the audience's attention and ensure that the results do not become unwieldy and overcomplicated. First, the most basic and initial step to acting on the recommendations for funding opportunities will likely be applications to the identified organizations or grant providers, so qualitative data is best because deciding on what opportunities are most appropriate for Peoria requires a level of decision-making and analysis that cannot be achieved by quantitative metrics alone. Second, effective citizen education and outreach rely heavily on a local government's ability to accurately understand its communities' culture and responsiveness.

The following interview questions were utilized during this phase of the project:

Interview questions for Peoria city staff

1. How does Peoria educate its citizens on water conservation and other sustainability initiatives?
2. What are common pain points that your department experiences when dealing with new funding endeavors, if any?
3. How does Peoria collect citizen feedback on sustainability initiatives?
4. In your experience, what does the successful citizen education and outreach look like? Or what do Peoria residents respond to?

Interview questions for other Arizona local governments

1. What do you feel are important logistical considerations that must be addressed when considering new sustainability investments?
2. What are common pain points that you experience when dealing with new funding endeavors?
3. How does your city educate its citizens on water conservation and other sustainability initiatives?
4. How does your city collect citizen feedback on sustainability initiatives?
5. What are some unique policy considerations of sustainability in your city?

Survey of Peoria residents

According to city staff, Peoria residents are most engaged at the neighborhood level. Collecting information from as many residents as possible and identifying potential neighborhood stewards helps strengthen the developed recommendations by ensuring that city staff and citizens are passionate and well-informed about the importance of taking part in environmentally responsible behaviors. After an initial discussion of potential survey questions, it was identified that Master of Sustainability Leadership research group, also working with Peoria and ASU Project Cities, collected survey responses on sustainability initiatives from Peoria residents. This data was shared and used in this project because the questions were in near-perfect alignment with the initially drafted questions.

FINDINGS AND ANALYSIS

Several works described in the literature review support research on funding initiatives related to public engagement. In contrast, others identify cautions that must be acknowledged in the pursuit of implementing specific water conservation ideas. The review of relevant academic or peer-reviewed articles found significant correlations of citizen engagement with favorable water conservation habits at local levels.

The findings of Wang and Berman's 2014 study of funding for conservation initiatives in Florida local governments present a valuable basis of analysis when considering the general topic of water conservation funding for a local municipality like the City of Peoria. The framework created by these researchers was used to identify and interpret different sources and approaches (types) for conservation funding in general. The authors also explain why some localities spend more on conservation costs than others. To the scope of the project at hand, the most relevant findings were that due to the reality of increasing debt at all levels of government, it is advised that local governments begin to explore "new financing opportunities [...] in business investment, [such as] public-private partnership in financing, non-profit financing and in the use of business-like funds in government" (Wang & Berman, 2014, p. 747). The implications of these results for Peoria's water conservation funding efforts point to paying special attention and research to funding opportunities outside of the public sector.

Citizen engagement

A 2017 study of energy efficiency financing (EEF) in American local governments found a significant correlation between the effectiveness of financial endeavors in sustainability efforts and citizen engagement. It was found that "[p]ermanent institutional arrangements to engage stakeholders can help improve and sustain EEF in stressful fiscal conditions," which addresses the foundations of the research questions. This is particularly noteworthy because it connects the basic elements of the two research questions outlined in this document. Specifically, it touches on the interests of finding successful strategies in other local governments and the longevity aspect of the overall concerns inherent in making significant investments into seeking new funding methods (Wang & Hawkins, 2017, p.16). Since the results of this study have implications related to Peoria's interest in improving and expanding public education and outreach around water conservation and sustainability initiatives, it is a valuable article for its assistance in building the project's final recommendations matrix and engagement examples.

Public-Private partnerships

Findings by Wang & Hawkins also reinforce the previously mentioned 2014 study's claim that public-private partnerships or interaction with non-profit organizations may be a promising lead in developing recommendations for funding strategies. This recommendation is stated with a focus on citizen visibility of these public-private or non-profit interactions as claiming that "[t]he involvement and support from professional groups may be seen by citizens as a condition for the successful implementation and a momentum-builder needed for citizens' continual involvement" (Wang & Hawkins, 2017, p.16). This is considered a practical perspective to include as an element of the final recommendation matrix.

Municipal practices and perspectives

Water restriction

A somewhat adjacent but still noteworthy item of research evaluated as a part of this literature review has to do with the use of water restriction practices at the local government level. A case study from the State of Florida brought forth findings that revealed information relevant to the background of water conservation in general and may offer some avenues for future research after this project.

The focus of this 2012 study was on the accuracy and practicality of how water restriction policies are evaluated for effectiveness. The researchers determined that typically the effectiveness of policies aimed at reducing water use are measured by resident compliance following a **day-of-the-week water use mandate**, but this approach fails to account for the actual amount of water used by residents (Survis & Root, 2012). The overall conclusion of this article confirms the lack of reliability in compliance-based measurement and proposes future research on quantifiable water conservation efforts. While this information does not directly relate to building recommendations for Peoria's interests, it is crucial to recognize the disparities present in current typical water conservation measurement practices used in other localities to best avoid implementing efforts that could turn out to produce unreliable metrics.

Editor's Note
Day-of-the-week water use mandates usually refer to the restriction of heavier water use, such as for yard irrigation, to one day per week.

Economic capacity

Kwon & Bailey's (2019) study took a heavily qualitative approach to examine local water sustainability practices and found relational evidence between environmental factors and community wealth in adopting water conservation practices. This perspective brings to light the importance of the economic capacity of a local government to implement water conservation efforts. This kind of evidence would support the overall purpose of Peoria's inquiry on funding initiatives because it emphasizes the practical considerations a local government must make when addressing water use, the most pressing of which is funding itself. Interestingly, however, community wealth itself (not municipal funding) was found to be the impactful factor on the adoption of conservation programs, which "suggests that local governmental fiscal condition needs to be examined more in-depth both theoretically and methodologically in the future research to better know its impact on local sustainability, in general, and water conservation" (Kwon & Bailey, 2019). Despite these somewhat contradictory findings, the article is still meaningful to include. It highlights another aspect of public policy analysis that may have otherwise been overlooked.

Water conservation and rates

A 2012 article from the American Water Works Association evaluates a seemingly straightforward approach to address water conservation funding via the prices for water use. This is described as "seemingly straightforward" because the article discusses the disincentive that policymakers and water distribution organizations look at how water sales and water-saving intentions misalign. One of the realized requirements of a successful water conservation rate structure discussed in the article is that the structure must be considered "fair" by its customers.

To investigate this concept, the authors assessed the importance that their customers attribute to rewarding environmentally conscious behavior, "[s]urvey results [...] showed that customers expect water rates to reward efficient users and penalize water wasters," as illustrated by Figure 1 (Ash, 2012). These findings and Ash's discussion of the effectiveness of water rate structure manipulation identify water rates as a form of funding and emphasize the practicality of restructuring rate systems. This is an important consideration because it can help make informed analyses of water conservation funding endeavors and help determine if this approach is appropriate for the City of Peoria.

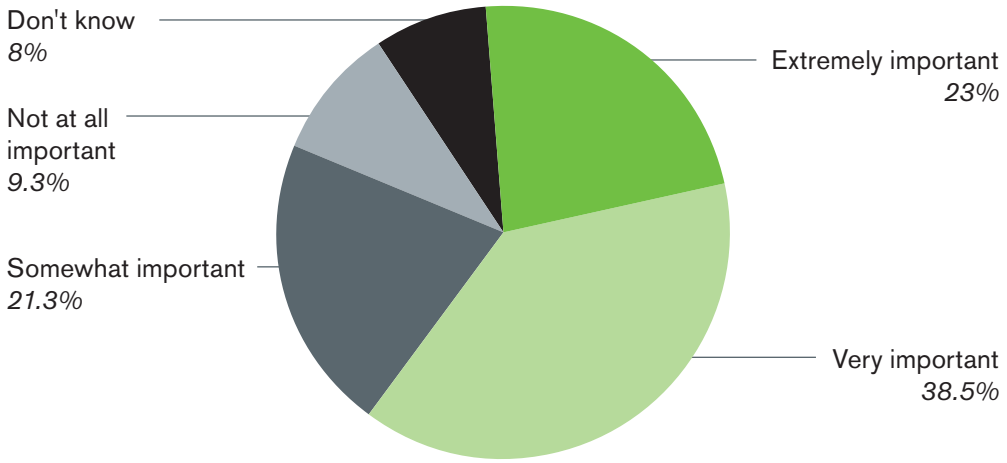

Figure 1 *Customer survey results ranking importance of rewarding water use efficiency and penalizing water waste, by City of Riverside, California*

Public education

A 2017 Multipurpose Household Survey was utilized by researchers in Italy to investigate factors that influence water conservation behaviors. They found a correlation on a variety of levels with the increased likelihood that citizens would act consciously with their water use and general environmentally impactful habits. A chart built for the discussion of their results (Figure 2) creates a visual display of the factors that are more or less likely to impact water conservation behaviors, with special attention to socio-economic factors (Aprile & Fiorillo, 2017).

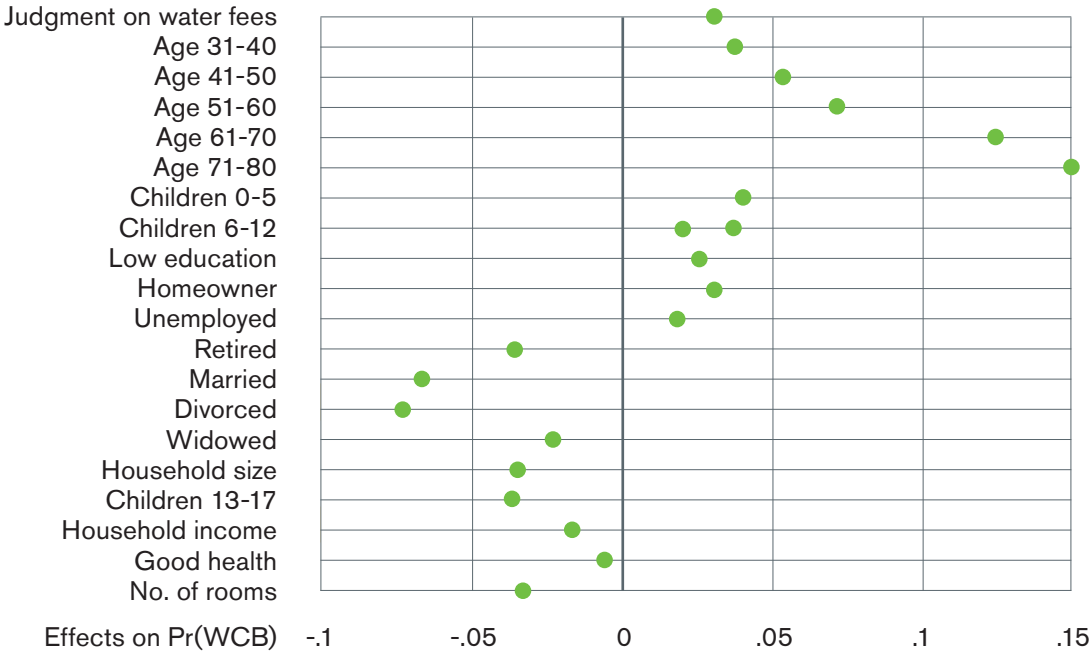

Figure 2 *List of factors that impact public engagement, from Aprile & Fiorillo, 2017*

Overall, the study found the factors listed in Figure 2 have an impact on public engagement at the individual level. It concluded that public campaigns to educate residents on environmentally friendly changes have the greatest potential to improve water conservation behavior at all levels (Aprile & Fiorillo, 2017). This information will be used for the context of Peoria in helping to develop the questions for the neighborhood survey that will be sent out to gather information on demographics, public opinion of sustainability initiatives, habits of water use, and civic engagement. Upon review of these responses, it will be an asset to compare the results with those of the Italian study to identify potential recommendations or areas of future research for Peoria to explore.

Localized efforts

Looking further into the relationship of civic engagement, sense of community, and environmentally responsible behaviors, a 2015 survey of 1,131 residents in the State of Virginia corroborated and expanded on findings of the 2017 Aprile & Fiorillo study. This research held a stronger focus on social identity and comparing local versus regional perceptions of self as a factor of environmental engagement. The findings show that "increases in one's sense of community were associated with increases in willingness to protect water resources and [...] pro-environment behavioral intentions were stronger when identity was more localized (neighborhood-based rather than regionally based)" (Forsyth, van Vugt, Schlein, & Story, 2015, p.233). Neighborhood-level engagement appears to be a significant success in citizen engagement and education.

The implications of these findings are significant and are reflected throughout the final recommendation development. By using the survey responses and interviews with city staff in conjunction with literature review analysis, final recommendations are tailored to be the most pragmatic and practical as possible. Recommendations are also vetted for practicality and consider a variety of policy considerations, one being the implications of community wealth.

Water use monitoring technology

Advanced metering infrastructure

In addition to citizen education and awareness on best practices for residential and commercial water conservation, the use of high-tech metering devices and software could augment the efforts of a local government or utility company by putting the water use data in the hands of the users. Advanced metering infrastructure (AMI) is "an integrated system of smart meters, communications networks, and data management systems that enables two-way communication between utilities and customers," which entails a significant increase in functionality from traditional manual water metering systems (U.S. Department of Energy, 2016, p.4). The capabilities of this technology include hourly reads sent to a self-service platform rather than the traditional efforts of obtaining monthly meter data by physically accessing each meter (City of Tempe, 2020, p.11). The data collected via AMI technology benefits both the residential self-service users and the facilitators of the water utilities (e.g., local governments).

WaterSmart platform

The WaterSmart platform is a form of software that can be integrated with water services infrastructure to create a clear and concise dashboard of metrics on a building's water use. The platform can be applied regardless of meter type and offers customers the ability to view water usage information, leak alerts, bill forecasting, and meter health notifications (WaterSmart, 2021). When coupled with AMI technology, advanced features and metrics can become available so residents and Water Services personnel can conduct analyses and identify trends and opportunities for water conservation intervention. The WaterSmart platform and AMI are both currently used by the City of Tempe, which has seen an overall per capita decrease in residential water use since the systems were implemented (City of Tempe, 2020, p.11).

Forms of funding

The most practical approach for significant funding of new water conservation endeavors is through grant opportunities which could be applied to capital projects and the expansion of current operations initiatives. While the use of public-private partnerships was identified in the literature review as a significant and promising avenue for generating funds, this approach is best used for collaborative project-based funding rather than lump-sum donations.

Based on information from interviews with staff from Mesa, Tempe, and Scottsdale, the project team concluded that the most realistic and successful approaches to using public-private partnerships is through events which involved partial funding and volunteer efforts from local businesses, as well as citizen volunteers. Therefore, the focus of the recommendations will be on grant opportunities, the practical application of grant funds which would lead to long-term funding allocation effectiveness, and strategies for the responsible investment of funds. Figure 3 lists potential funding sources the City of Peoria may want to consider.

Funding opportunities

Funding source	*Funding type*	*Application details*	*Grant website*
Salt River Pima-Maricopa Indian Community	12% Gaming Grant	Apply through the Maricopa County Gaming Grant website.	https://maricopa.smapply.io/
Fort McDowell Yavapai Nation	12% Gaming Grant	Apply through the Maricopa County Gaming Grant website.	https://maricopa.smapply.io/
Gila River Indian Community	12% Gaming Grant	Apply through the Maricopa County Gaming Grant website.	https://maricopa.smapply.io/
Bureau of Reclamation Grants	50/50 cost share funding grant	Multiple applications for funding may be submitted for consideration on different projects.	https://www.usbr.gov/watersmart/weeg/
Water Infrastructure Finance Authority of Arizona	Loan	Projects must be defined; the city must obtain approval through a bond election.	https://www.azwifa.gov/programs/funding-type/application-process
Salt River Project Community Grants	Monetary and in-kind contributions	Peoria already received this grant for Aquatics, consider adding Water Services to the next application.	https://www.srpnet.com/community/contributions/civicenv.aspx
EPA Multipurpose Grants	Non-competitive categorical grant programs or standalone grants	Must be done at State level, would need to collaborate with AZ representatives.	https://www.epa.gov/grants/multipurpose-grants-states-and-tribes
Grants.gov	Varies	Centralized database of federal funding opportunities, including guidance and grant writing tips.	https://www.grants.gov/web/grants/search-grants.html

Figure 3 *Funding source opportunities recommended for the City of Peoria to further investigate*

Rebate programs

The survey results found that residents have expressed appreciation for the rebate and have suggested other forms of water-reducing technology, such as smart timers and instant hot water technology. Many other Arizona cities have rebate programs as well, some of which include items that are not yet covered in Peoria's program. At the time of this report, Peoria's rebates are given on a first come, first served basis and there are a limited number of rebates available each fiscal year (Water Rebate, 2021).

Collaborative projects

As demonstrated in the reviewed literature for this project, it is apparent that public-private partnerships have had success in other cities around the United States as well as abroad. Upon discussion of these types of ventures with other Arizona local governments, the most practical utilization of these types of professional relationships is through collaborative events or projects. Partnering with resident volunteers and local non-profits is a significant opportunity for public engagement and the efficient execution of water conservation projects. The Watershed Management Group, now solely taking on projects in Tucson, has been utilized in the past by various cities around the Valley to work on landscaping, including **xeriscape** projects. The City of Mesa has collaborated with local businesses and nonprofits with significant employment in their area, like Home Depot, Caterpillar, Sprouts, and Apple to work on water conservation landscape projects and educational events.

Editor's Note
Xeriscape is a type of landscaping that seeks to reduce water consumption through the use of drought tolerant plants and low water use methods.

Education and outreach

When asked about their preferred communication methods related to education and outreach, 38% of respondents on the Peoria resident survey answered that they would like "more social media posts" and the fill-in answers were overwhelmingly focused on improved routine email communication. The City of Peoria already has an extensive monthly print newsletter, PeoriaNOW, which is distributed to residents by being enclosed in their water bills. These newsletters are also available as PDFs on the City website. The disconnect that residents seem to be having with this information is a lack of knowledge on how to sign up for the email version, which would make it more convenient and accessible to access information on the go or prior to receiving their utility bill.

RECOMMENDATIONS

Funding strategies

Expand the rebate program

Given the enthusiastic response from the 2021 Survey of Peoria residents, it is recommended that city leaders consider expanding the existing rebate program. It is recommended that funding received from an above-mentioned grant or allocated from the enterprise fund be used to expand Peoria's capacity for offering rebates under the current program, and ideally add other qualifying water-saving devices to the rebate program such as smart timers and instant hot water technology.

Collaborate with local non-profits

It is recommended that Peoria reach out to local nonprofits such as the Watershed Management Group, the Nature Conservancy, and the Environmental Fund for Arizona to collaborate on the funding and the realization of capital projects related to water conservation. The City of Tempe would collaborate with Peoria to invite Watershed Management Group to come back to Maricopa County to work on new projects.

Pursue public-private partnerships

Bringing grant funds to public-private partnerships will make it easier to define the scope of work, budget and establish a practical plan of action for water conservation projects. It is recommended that the City of Peoria partner with local companies to augment pre-defined projects while also using funding from grant resources, as noted above. Relevant private-sector employers include Walmart Stores Inc / Sam's Club, Younger Brothers Companies Inc, The Antigua Group Inc, Immanuel Caring Ministries, Arizona Medical Clinic, OakCraft Inc, Freedom Plaza Peoria, West USA Realty, Concrete Structures, and Support Services Complex.

Improve water monitoring infrastructure

It is recommended that the City of Peoria invests in providing citizens with advanced metering infrastructure coupled with a self-service dashboard software such as WaterSmart. While this would be a significant investment that would most likely need to be funded by the capital projects enterprise fund and grant funding, the long-term effects could be that overall operations expenses for water services could be lower and more funds could be allocated from operations to capital projects.

Investment in this kind of technology could also be paired with education and outreach opportunities to supply residents with a robust understanding of their water consumption by the gallon and help them better develop a perception of what activities are costing them more. This data could be combined with educational materials on household water-reducing strategies to encourage residents to act because they will be able to see the real-time result aside from just their monthly water bill.

Education and outreach strategies

Increase awareness of the PeoriaNOW email option

Given the success of PeoriaNOW, the monthly newsletter enclosed with Peoria water bills, the immediate recommendation for expanding resident knowledge of email newsletter accessibility would be to include messaging on the PeoriaNOW flyers themselves. At the time of this report, the heading of the flyer includes icons for Peoria's social media pages, and there is a small gap below this that could be utilized to add text along the lines of "Contact news@peoriaaz.gov to sign up for the virtual newsletter" or "Have this news sent directly to your inbox by contacting news@peoriaaz.gov."

Host neighborhood pop-up events

In-person events held in neighborhoods around Peoria have been used by various city departments to engage with citizens and educate them on projects and initiatives. It is recommended that city personnel work closely with homeowners' associations to coordinate events that are specifically related to water conservation education for the surrounding area. This could include materials covering the current rebate programs and conservation initiatives. Increased interaction with homeowners' associations could also lead to opportunities to discuss projects such as turf replacement, xeriscape gardens, and transitioning to water-saving infrastructure in yards and communal areas.

Engage users on social media

The utilization of Peoria's social media accounts is the fastest way to send news to residents on sustainability projects and events. Many components of the City's water conservation efforts involve visually engaging topics such as xeriscape gardening and materials that qualify for rebates. Additionally, social media can be used to promote sign-ups for classes in the Sustainable U Series.

Add a "Water Conservation Specialist" staff position

The City of Peoria currently employs a Sustainability and Water Conservation Coordinator and a Sustainability and Environmental Conservation Assistant who are the primary facilitators of Peoria's water conservation efforts. Given the size of Peoria and conservation efforts in place, combined with the recommendations in this report, it could be beneficial to city staff as well as residents to have additional staffing dedicated to sustainability and water conservation. The functions of this kind of specialized staff member could include grant writing, expansion and management of the rebate program, coordination of capital projects with businesses and HOAs related to water conservation, communication with local businesses on public-private partnerships, and assistance on the new Water Conservation Kit program. The City of Scottsdale's job description for their Water Conservation Specialist position could be reviewed as a guiding reference for the utility of this type of position. The job description is available at **https://www.governmentjobs.com/careers/scottsdaleaz/classspecs/761794** or in the appendix of the original student content at **links.asu.edu/PCPeoriaSustainabilityPlanning20-21**.

CONCLUSION

In terms of actionable funding opportunities, the most effective funding source would be taking advantage of grant opportunities. Grants are a practical and relatively consistent resource for funding projects and augmenting the existing water enterprise funds. This endeavor would require time and personnel efforts related to grant funding and monitoring of grant application timelines and new opportunities.

Public-private partnerships are best utilized through collaborative projects, not relying solely on private collaborators' funding. The City could develop partnerships with local businesses and homeowners' association administrators to receive assistance through labor on community projects and, ideally, partial funding. Private companies may benefit from participating in projects involving volunteers in community spaces because they will generate goodwill among residents. Businesses that participate can represent themselves as a steward of environmentally friendly behavior in the area, and it could also help with their marketing and recruitment.

Residents of Peoria are passionate about water conservation and have a desire to learn more about how they can make smart choices in their own lives, as well as be knowledgeable about the efforts that the city is making toward a more sustainable future. Since there are already several educational materials and programs that Peoria has created and maintains, the greatest opportunity for increasing citizen engagement is through the advertisement of these resources. Neighborhood pop-ups increased email campaigns, and social media promotion would be the most cost-effective strategy for boosting citizen education and outreach.

Tying all the recommendations together, the City of Peoria would benefit from increased staffing to tackle the challenges outlined in this report. A significant time commitment is needed for grant writing and the maintenance of water conservation initiatives like the rebate program, water use consultations with residents, and the coordination of projects that involve nonprofit or private business support. Creating an additional position within the realm of sustainability and water conservation would allow Peoria to dedicate more time and resources to make lasting changes in water use reduction. The subsequent long-term benefits could also result in increased efficiency of said initiatives and free up funding allocated to water operations so the City can continue to focus more on sustainable water capital projects.

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To access the original student reports, additional materials, and resources, visit:

links.asu.edu/PCPeoriaSustainabilityPlanning20-21

The following report summarizes and draws highlights from work and research conducted by graduate student Michael Engelbrecht in PAF 509 Public Affairs Capstone, for the Spring 2021 partnership between ASU's Project Cities and the City of Peoria.

To access the original student reports, additional materials, and resources, visit:

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ASU Sustainable Cities Network
Arizona State University

Project Cities

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Sustainability through local action

PART 4:

Funding Sustainable Recycling Programs in Peoria

IDENTIFYING RECYCLING INNOVATIONS THROUGH POLICY, FUNDING, AND OPERATIONAL TECHNOLOGY

PAF 509: PUBLIC AFFAIRS CAPSTONE

SCHOOL OF SUSTAINABILITY

FACULTY
MALCOLM GOGGIN AND
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INTRODUCTION

The City of Peoria has retained student researchers through the Arizona State University Project Cities Network (PCN) in coordination with the School of Public Affairs Master of Public Administration and Policy programs to identify and assess the needs of sustainability efforts currently recognized by city leadership. Among the needs identified, wastewater and recycling operations were chosen to pursue research that could examine the funding structures and recommend tangible solutions that generate revenue for the City of Peoria in a sustainable manner.

This project focuses on the recycling program for the City of Peoria run by the Solid Waste Division, which is responsible for residential and commercial waste collection. While the department oversees the collection and disposal of trash, bulk trash, recycling, and hazardous household waste, this report only discusses recycling as it relates to the funding and costs of maintaining a program that achieves City of Peoria livability initiatives, such as its commitment to healthy neighborhoods and providing superior public services.

The main objective of this project is to recommend appropriate funding opportunities for the City of Peoria, as well as discuss and analyze:

1. Existing policies or agencies that guide, regulate, or fund existing municipal recycling programs,
2. The cost and use of operational technology including facilities, equipment, and education, and
3. Private support by waste management networks, customers, and community actors.

Each of these discussions incorporate the City of Peoria recycling program model and draw from academic literature and expert opinion to advance the conversation and create relevant recommendations.

Background

Recycling in the United States has caught on almost as well as the phrase reduce, reuse, recycle. Following the implementation of a series of environmental policies in the United States developed through the 1970s, state and municipal governments have recognized the potential of recycling to divert waste from landfills while generating revenue by selling recyclable materials to domestic and international processors (Mulrooney-Eldred, 2020; Biddle, 1993).

While the topics of waste generation and recycling are important nationally, this section is meant to describe the characteristics of the City of Peoria, detail actions taken by elected officials and city staff regarding sustainability and recycling, and highlight some of the key issues facing municipal recycling operations generally that should be considered before applying this project's approach.

City of Peoria

Editor's Note
At the time of this report, the student reported Peoria's 2019 population. Currently, Peoria's population is 191,000.

The City of Peoria is situated in the northwest Greater Phoenix Area but extends across Arizona's Maricopa and Yavapai counties and covers 174.4 square miles (Census, 2010). The population of Peoria was estimated to 175,961 in 2019 with 59,659 households (Census, 2019). Additionally, the City enabled the operation of 12,060 businesses in 2012 (Census, 2012). Demographically, Peoria is mostly white with 20 percent of the population identifying as Hispanic or Latino (ACS, 2019).

As part of the city charter, there is a Mayor and City Council with representatives from each of the six districts (City of Peoria, 2016). Additionally, the City Manager assembles staff and implements policy at the direction of elected city officials. Currently, the Office of the City Manager boasts 1,100 full-time employees which staff 14 departments managed by the City (City of Peoria, 2020).

Sustainability and recycling

Peoria's official sustainability efforts began in May 2009 as a direct response to fiscal and budget difficulties affecting the ability to fund programs (City of Peoria, 2010). Part of the City Council's vision was to achieve energy efficiency, environmental protection, and fiscal responsibility (City of Peoria, 2010). Toward this aim, a Sustainability Committee was formed which created Peoria's *Sustainability Action Plan* (*SAP*) by documenting the goals and achievable actions for cost-effective green practices (City of Peoria, 2010).

Within the *SAP*, to integrate sustainable decision-making into city planning for land use, transportation, energy, waste, water, and green space, was a goal to expand the recycling program headed by the Solid Waste Division (City of Peoria, 2010). A 2013 review of sustainability practices in the City of Peoria shows an increase in recycling opportunities at city-owned facilities and the use of water fountains to cut down on plastic bottle recycling (City of Peoria, 2014). Educational tools online and in print have also been distributed to improve participation and reduce contamination, while efforts to minimize carbon footprints have been employed such as the use of hybrid collection vehicles (City of Peoria, 2014).

In 2016, renewing the City of Peoria's commitment to sustainability led to an updated *Sustainability Action Plan 2.0.* This plan incorporated recycling and waste reduction into six defined areas, specifically mentioning an increase in opportunities for residential, commercial, multi-family, and municipal recycling, as well as visitors of city buildings and parks (City of Peoria, 2016). The recycling program itself currently offers co-mingled curbside collection for single-family homes, and commercial and multi-family residential collection at a per container service rate of up to seven days a week depending on the size of the container (City of Peoria, 2021). Collected solid waste is then transported to area landfills and materials recovery facilities (MRF) where the City of Peoria is charged per ton of disposable material (City of Peoria, 2021; City of Phoenix, 2021).

Figure 1 *City of Peoria solid waste collection vehicle*

Urgency

While the City of Peoria recycling operation appears to be standard practice, there are some unique differences in how Peoria funds its recycling compared to other municipal solid waste programs. However, the City is seeking additional funding opportunities to offset the cost to its residents and businesses resulting from changing macroeconomic conditions that have led to rising costs for solid waste disposal (Corkery, 2019). Additionally, the COVID-19 pandemic can be partially responsible for increasing the volume of recyclable materials leading to higher costs at MRFs (Brock, 2020). At the same time, the price of new plastic is undercutting that of recycled plastic in many regions due to the decreased demand for fossil fuels which affects the price of virgin materials (Brock, 2020).

China had been an integral partner to many locales as a reliable buyer of recyclable commodities such as plastic and paper (Katz, 2019). Some estimate that 70 percent of the United States' plastic waste was purchased by Chinese processors (Katz, 2019). However, in January 2018, the National Sword policy in China banned the import of 24 types of recyclable goods, decreasing their plastics imports by about 99% and paper imports by a third (Katz, 2019). Globally, policies in China impacted many recycling arrangements and stressed many recycling programs as private stakeholders began to consider the market unprofitable (Katz, 2019).

Literature review

While the background section is meant to provide a baseline understanding in the context of this project, academic literature serves to incorporate the findings and opinions of research that might apply to the topic at hand in a more general or even different way. Several academic fields provide the opportunity for discussion regarding municipal solid waste and recycling as well as operational finance. Notwithstanding, only research containing policy or program guidance, as well as solid waste management were considered for inclusion in this document. While potentially relevant to the City of Peoria's decision-making process, other resources that discuss the psychology of recycling, environmental impact, or economics might be leveraged to serve the same purpose of increasing revenue and reducing costs of municipal recycling.

Policy environment

Murphy, Bernard, Helm, Hill, and Tuñas-Corzón (2020) assess the decline in Arizona municipal recycling by examining Arizona's regulatory framework and interviewing local officials in the most populated cities of twelve counties in Arizona. The authors reference several statutes that support or hinder local recycling operations. Two statutes referenced directly address revenue generation such as the Recycling Fund which is used to provide grants to municipalities to implement recycling programs and educate citizens (Murphy et al., 2020). Additionally, a city or town cannot impose any fee or tax, nor regulate the sale or use of auxiliary containers of business, commercial property, or multifamily housing, which suggests that such establishments cannot be held accountable for their role in the solid waste generation (Murphy et al., 2020).

However, there is no existing law at the national level that governs recycling in the United States (Schultz & Hildreth, 2020). This is likely because recycling has largely been viewed as a successful free-market enterprise. Calcott and Walls (2005) agree with this understanding but suggest that there should be policy and that it should incentivize upstream and downstream behaviors, namely product design and recycling. Ideally, they argue that a perfect market would incorporate the value of goods made with recycled materials, but this has not shown to be the case and manufacturers are incentivized to minimize costs when designing a disposable product (Calcott & Walls, 2005). Nevertheless, the authors conclude that with a market approach, a tax on all goods combined with a recycling subsidy could be optimal for increasing revenue and encouraging the practice of recycling (Calcott & Walls, 2005).

Highlighting the upstream approach and considering that businesses, commercial buildings, and multifamily housing are currently exempt from taxes or other regulations surrounding single-use auxiliary containers such as bags, boxes, cans, bottles, cups, and other containers, implementing extended producer responsibility (EPR) in Arizona would be difficult without significant legislative support. EPR is a policy tool that requires manufacturers to bear financial responsibility for the life cycle of their products (Nash & Bosso, 2013). This can include the costs of collecting, recycling, or disposing of products the consumers no longer want (Nash & Bosso, 2013).

While the most notable EPR legislation, the Waste Electrical, and Electronics Equipment (WEEE) Directive, affects the entire European Union, local governments in several states have formed product stewardship councils with help from organizations like the Product Stewardship Institute and the Product Policy Institute (Mayers, Lifset, Bodenhoefer, & Van Wassenhove, 2012; Nash & Bosso, 2013). There are reasons this is appealing to governments as it shifts the costs of waste disposal to the producers, but it also encourages producers to consider the waste of their products during the design phase.

Revenue

Waste generators are likely to be targeted for increasing recycling prices. This is attributed to the difficulty for municipalities to expand services, and producers, distributors, and retailers (at least in Arizona) sharing none of the costs. Kinnaman (2006) discusses how finance schemes are different, referencing three types of curbside pricing.

Historically, most programs charge fixed monthly or quarterly fees, and the cost of contributing additional waste for a household is zero (Kinnaman, 2006). Several types of curbside waste-collecting were introduced with their pricing schemes. A bag and tag operation requires the customer to bag items and place a sticker identifying the type of waste and pricing per bag collected (Kinnaman, 2006). Weight-based systems fit collection vehicles with scales to measure the waste being disposed of. Subscription services limit customers to specific canister sizes and are billed according to size regardless of contents (Kinnaman, 2006). Thus, Kinnaman (2006) argues that marginal decision-making plays a role in customers' choices to participate in recycling programs and suggests that a landfill tax would incentivize such participation.

Bharadwaj, Rai, and Nepal (2020) explored revenue generation for municipal solid waste management. Their results suggest plastic material recovery could improve revenue while increasing recovery rates and collection efficiency by reducing the costs of managing plastic waste. The authors reference growing interest in waste to energy conversion and bans non-recyclable or difficult to recycle materials yet suggest both are difficult for municipalities with limited resources and enforcement to consider. Instead, targeted collection and recovery of high-value materials, private-sector engagement, and the introduction of a one percent import duty on plastic materials are recommended to generate sufficient revenue. It is important to note that Bharadwaj, Rai, and Nepal do not discuss enterprise funds as part of their analysis.

RESEARCH METHODS

Following the background and literature review sections, this report must consider how to apply the knowledge generated for use in determining how the City of Peoria can act. Without a strong framework to evaluate sustainable funding options for recycling programs discussed among the literature and the lack of uniform policies or programs at local, state, and national levels of government, it appears that the most appropriate approach for this project is to develop methods that reflect the uniqueness of the City of Peoria and attempt to analyze the actions of its recycling program systematically.

Thus, the methods of this report are that of a single case study, in as far as the collection of actions and initiatives implemented by the City of Peoria towards a sustainable recycling program can be considered a single case. The research draws from informal interviews over email and shared documents to understand better administrators' procedural and financial decisions overseeing the current recycling operations. While most of the documents and reports used are publicly available, the notes and emails obtained from City of Peoria administrators are not publicly available at this time. Thus, participants will not be listed without their express permission. Yet, it is also the case that no administrator asked to remain anonymous either and may be included later.

Several key questions have been considered in the decision for what to include in this case study and continuing analysis. For instance, what are the existing processes and costs of the City of Peoria recycling program? What are the appropriate funding mechanisms and related barriers to implementation? How can administrators evaluate fiscal opportunities relative to sustainability? The questions will be used to identify actions and initiatives implemented by the City of Peoria and reexamined if shown to use instances of funding worth discussing.

After identifying critical or distinct examples from the City of Peoria recycling program, criteria have been proposed to evaluate past actions or alternatives and determine whether a process or project is indeed sustainable. The criteria believed to be the most appropriate apply the pillars of sustainability and consider environmental, social, and economic considerations but also whether funding is expected to be regularly scheduled. Thus, each criterion will be applied independently using a proposed matrix (See Figure 2).

Sustainability funding matrix				
Alternative	***Environmental effect or improved asset?***	***Fiscally responsible?***	***Socially accepted?***	***Regularly scheduled?***
EPA Healthy, Resilient, and Sustainable Materials Management Grant	Must meet SMM program focus areas	Grant funds are additional funds outside of the normal budgeting process	Not yet available to EPA Region 9	No
Arizona Recycling Fund	No direct effect; used to pursue research or implement research	Yes; funds would be transferred directly into the budget	No funds appropriated	Possible
Enterprise Funds	Directly supports solid waste operations and diverts landfill waste	Funds are part of the budgeting process distributing only as needed	As long as utility rates remain acceptable	Yes; incorporates monthly billing and yearly expenditures
Blue Lid Pilot Program	Improve residential recycling containers; expected to decrease contamination	Grant funds are additional funds outside of the normal budgeting process; covers cost of pilot	Study not yet concluded	No
Vehicle Purchasing Program	Includes environmental consideration	Vehicles can be purchased and sold; considerations include cost-effectiveness and longevity of investment	Saved costs can be spent for more beneficial programs	Yes
MRF Investment	Improved diversion and value added to MRF	$1 to $1 return on investment	Does not increase utility costs	Scheduled period for the duration of remaining credit
Routeware	Reduced vehicle impact through route optimization	Operational cost savings	Used to evaluate better service	Implementation and subscription costs

Figure 2 *Proposed sustainability funding criteria matrix*

While the purpose of this matrix is to evaluate current Peoria program initiatives, it can also be used for future planning and project proposals. Thus, the use of the criteria from this matrix will be applied to both analysis and recommendations for new funding opportunities or recommended initiatives throughout this report.

FINDINGS AND ANALYSIS

The City of Peoria recycling program is subject to several areas of influence that shape how the program maintains funding. Explicitly, policies and procedures govern how the city designates its recycling agencies and appropriates funding towards those agencies. Externally, other factors guide decision-making and offer opportunities to improve revenue beyond traditional budgetary processes. While the City of Peoria prioritizes general fund expenditures during budget planning, solid waste priorities are discussed to determine the appropriate level of spending in a fiscal year (City of Peoria, 2020). Solid waste operations are funded from the City's residential and commercial solid waste enterprise funds (City of Peoria, 2020).

In the FY 2021 proposed budget for the City of Peoria, such changes can be seen with the mention of a 6 percent increase in the residential solid waste utility rate (City of Peoria, 2020). Cited reasons for the proposed increase include growing cost pressures, reduced recycling revenues, and increased landfill costs (City of Peoria, 2020). Additionally, small increases in the operating budget for the Public Works Department include expenditures for recycling but no changes in staffing (City of Peoria, 2020). Still, the balance for each solid waste fund appears healthy, even with proposed expenditures exceeding expected revenues.

Policies and agencies

Although the City of Peoria budget for solid waste, in particular recycling, is adjusted year to year, some policies and agencies offer further assistance to the Public Works department in the form of guidance and funding. In this section, national, state, and local legislation are examined to explore the impact of each on the City of Peoria's recycling program.

National

The City of Peoria references the Environmental Protection Agency (EPA) in several resources mainly relating to safe drinking water and wastewater practices. However, there is little to no information in the City of Peoria resources on EPA solid waste and recycling. This is likely to do with the earliest definitions of solid waste and recycling by the EPA. The Solid Waste Disposal Act of 1965 defines solid waste as a state, regional, or local responsibility and offers technical and financial assistance towards developing solid waste plans and improving technology (EPA, 2020). Expanding on the Waste Disposal Act, the Resource Conservation and Recovery Act of 1976 also encourages state environmental departments to manage nonhazardous industrial material and municipal solid waste (EPA, 2020). As recent as 2020, the EPA is still developing a national recycling strategy with objectives to reduce contamination, increase processing efficiency, and improve markets (EPA, 2020).

The EPA also operates the Sustainable Materials Management (SMM) program. The objectives of this program are to decrease the disposal rate, reduce environmental impacts, increase socio-economic benefits, and increase the capacity of stakeholders to adopt SMM policies, practices, and incentives (EPA, 2015). At the time of this report, some regions of the United States can apply to Healthy, Resilient, and Sustainable Materials Management Grants to address program focus areas (Grants.gov, 2021).

Given the lack of strong recycling policies at the national level or a single national recycling strategy, funding opportunities from the EPA or other national agencies will remain limited and offer no regularly scheduled assistance towards current City of Peoria operations. Additionally, with a region-based approach to offering grants and other financial assistance, Arizona municipalities are competing against others in California, Nevada, and several Pacific islands for resources, making it challenging to secure funds as they become available (EPA, 2021).

State

While the national stance allows states to determine their policies relating to recycling, Arizona also allows municipalities a lot of discretion regarding recycling. While regulations and laws do exist at the state level to ensure environmental compliance, there is no mandate for counties, cities, or towns to offer a recycling program. Title 49, Chapter 4, Article 8 of the Arizona Revised Statutes offers little in the way of improving municipal recycling programs.

As it applies to financing recycling operations in the state, a recycling fund collects disposal fees of solid waste brought to landfills by either volume or weight (A.R.S. § 49-836). This fund is appropriated by the state legislature but can be used for grants to or contracts with municipalities, nonprofit organizations, or private enterprises for research, demonstration projects, market development, and implementation of recommendations by any of the above (A.R.S. § 49-837). Additionally, the fund can be used for public information, education, or technical assistance programs not only related to recycling but also litter control and source reduction, as well as Arizona Department of Environmental Quality (ADEQ) solid waste control program activities (A.R.S. § 49-837).

Beyond ADEQ-run programs, the A.R.S. allows for municipalities to engage in intergovernmental contracts or cooperative agreements for solid waste disposal or recycling (A.R.S. § 49-703). Using this section, the City of Peoria has entered into such agreements with neighboring cities for the use of their facilities. This has allowed the City to minimize its recycling operation to the collection and transport of residential and commercial waste but limits direct involvement in selecting markets for recyclable materials.

Local

At the local level, solid waste practices are governed by Municipal Code Chapter 22 but do not discuss the funding of the Public Works utilities which is separately added to the Administration chapter. It also does not differentiate between solid waste and recycling programs, only that there are differences between the two types of waste and collection (M.C. § 22). It is important to note that the enterprise funds associated with solid waste, although utilized by the City, do not appear to be codified and thus, not mandated towards specific solid waste or recycling functions.

Operational technology

With policies that loosely govern how the City of Peoria operates its recycling program and facilities, the program is relatively straightforward. The SWD of the Public Works department is responsible for providing a full collection service through residential and commercial containers, vehicles, drivers, educational outreach, and inspection. Each aspect of the program has its operational technologies for performing these duties.

Containers

Currently, there is only one size available for residential recycling containers at a standardized price for customers (City of Peoria, 2020). The container is brown, differentiating from its tan or black trash counterparts (City of Peoria, 2020). Commercially, two types of containers are offered in different sizes from two to eight cubic yards (City of Peoria, 2020). Roll-off containers can also be requested at 20, 30, or 40 cubic yards (City of Peoria, 2020). Each of the commercial containers is blue and they are all collected by various collection vehicles.

At the time of this report, the City of Peoria has approved a Blue Lid Pilot Program (City of Peoria, 2021). The pilot introduces new lids for existing recycling containers. Each lid is blue and marked with acceptable and non-acceptable recyclables. The purpose of the pilot is to test whether these new lids affect levels of contamination in residential recycling. Audits will be conducted before and after the implementation of blue lids at 2,600 residences and will be reported in an upcoming waste characterization study (City of Peoria, 2021). Even more, this pilot is part of the Residential Curbside Recycling Cart Grant by the Recycling Partnership which offered funds intended for the pilot program costs (City of Peoria, 2021).

Vehicles

Vehicles are necessary for the collection of recyclables in a curbside program. The City of Peoria employs side-loading, front-loading, and roll-off vehicles to quickly consolidate trash and recyclables for transport to local facilities (City of Peoria, 2020). The city also reports changes to vehicle purchasing standards opting for Hybrid collection vehicles and retiring vehicles that are underutilized from their fleet (City of Peoria, 2016). Vehicles and drivers are not able to generate revenue, but instead, work to reduce operating costs that could be spent elsewhere.

Processing facilities

Even though there are no MRFs or transfer stations in the City of Peoria, considering the costs of processing recyclables has a direct effect on maintaining a recycling program. The Phoenix MRF charges Peoria for their recyclables by weight or volume and incorporates additional processing fees (City of Phoenix, 2021). Currently, the two cities maintain an intergovernmental agreement to define those costs. This has resulted in recycling costs that are comparable to those of trash disposal at landfills (Burke, personal communication, 2021).

One interesting example of leveraging this dynamic to Peoria's advantage has been the investment of new equipment at the Phoenix MRF. Payment for new equipment and modernization resulted in a credit to offset processing fees at the facility and minimized costs until credit was depleted (Rosengren, 2019; Burke, 2021). The value of the credits is also important. A one-to-one ratio per dollar was applied from investment to credit allowing the city to benefit both from temporarily reduced operational costs as well as the subsequent use of improved equipment leading to sustained diversion increases (Burke, 2021). Utilizing the Phoenix MRF allows for the City of Peoria to operate a recycling program without the need to invest in costly new facilities, yet it also creates risk if the facility becomes overburdened due to population growth and increased waste generation by residents of Phoenix. This could potentially lead to higher transport costs and different costs for processing elsewhere.

Educational tools

The success of a recycling program is often measured by increased diversion and reduced contamination. The City of Peoria currently diverts 20 percent of its landfill weight to recycling, up from 0.2 percent in 2001 (AZDEQ, 2001). It is one of the leading cities in diversion across the state, despite falling short of the national average rate of 32 percent (EPA, 2018). It is extremely relevant to remark on educational outreach when there is no quality control for diversion at the individual level.

Sustainable University (Sustainable U) is a program operated by Peoria to educate citizens on the City's sustainable practices and programs (City of Peoria, 2021). The program uses digital media and conferencing to connect residents to information that could be impactful for several sustainability initiatives. Recycling and composting are two topics discussed in pre-produced and interactive media that are available fairly regularly (City of Peoria, 2021).

Sustain and Gain is a brochure produced for residents annually that provides a wide variety of information, learning materials, and tips (City of Peoria, 2020). Neither resource is solely dedicated to recycling, yet the SWD does have a dedicated staff for education planning and outreach, which suggests that educational resources are not a single offering available through excess funds but part of a dedicated approach to improving diversion and other recycling outcomes (City of Peoria, 2021).

Data systems

The SWD is dedicated to releasing accurate information to its residents through educational resources and other online tools like the Recycle Right Wizard (Figure 3), which allows users to search for waste materials and determine the correct disposal action (City of Peoria, 2021). However, it appears the dissemination of data relating to the recycling program or other solid waste disposal is not readily available. Additionally, hardware and software that generate and utilize data are underdeveloped which could impact optimization and predictive capabilities in decision-making.

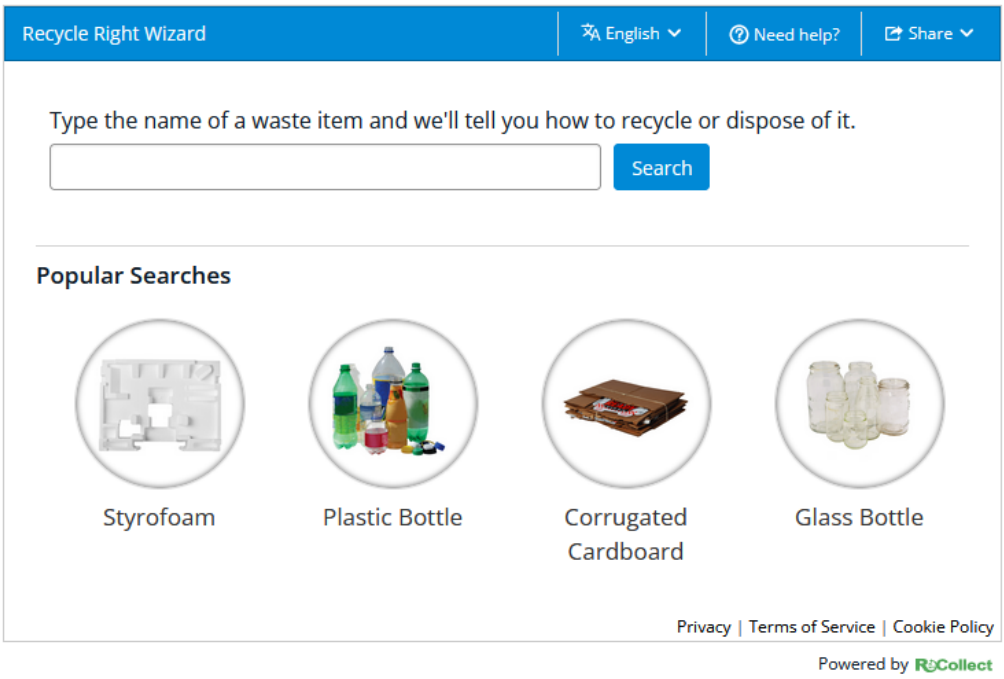

Figure 3 *Screenshot of the Recycle Right Wizard available on Peoria's recycling webpage*

There is an SWD initiative to install and implement Routeware, routing, and fleet optimization software (City of Peoria, 2021). Access to such data would be useful for improving routes but could also be useful for evaluating personnel performance and waste metrics or recording service actions to maintain transparency and accountability (Routeware, 2021). The use of optimization software seems appropriate to further reduce costs of manual labor and time even if challenged with an expansion of current offerings to address population growth or changes in waste generation.

Supporting organizations

Opportunities exist for funding arrangements from a wide array of government, non-profit, and private actors. While this report does not contain data of businesses or non-profit organizations, it should be reflected that building or maintaining relationships with organizations that value recycling, whether for economic, environmental, or societal reasons, should be leveraged when possible.

This project is the result of the relationship between the City of Peoria and Arizona State University Project Cities which organizes researchers that could be costly if hiring private consultants or dedicated staff. Additionally, such organizations are sometimes willing to fund research or development of recycling initiatives or programs directly or indirectly, possibly leading to useful improvements for revenue or cost reduction.

Partnerships and alliance organizations are non-profit entities that organize and collaborate towards a shared vision or outcome. ADEQ offers several organizations in Arizona such as the Arizona Recycling Coalition, Maricopa County Food System Coalition, the Recycling Partnership, and others as additional resources (ADEQ, 2021). However, beyond traditional funding opportunities through partnerships and alliances, these organizations also provide volunteers and expertise to aid in hosting events or recycling drives that can be used to minimize both the costs of planning and organizing while also offering indirect access to email lists and potential donors.

Limitations

As a single case study of the City of Peoria recycling program funding opportunities, this study fails to reflect the entire context of recycling in the city. By approaching this case through publicly available documentation, access, retrievability, and the lack of specificity may have contributed to analysis that appears incomplete. To improve the use of these methods in further examination of the City of Peoria, access to internal documents should be coordinated and digitally recorded.

The project was also constrained by resources and time, leading to a limited number of interviews. Additional interviews would have allowed the study to extract more information regarding details of all program aspects. Additionally, more resources and time could have suggested a different approach to analysis leading to different recommendations.

RECOMMENDATIONS

The actions and funding of the City of Peoria recycling program are diverse and vary in impact. Elements of the program align with a values-based, community-centered approach, while other elements are subject to restrictive policies and funding opportunities from national and state agencies. Still, the City of Peoria presents some unique opportunities to expand recycling through its growing customer base, commitment to sustainability, and developing relationships.

Design and implement a sustainable funding matrix.

Adopt a method of evaluating funding opportunities, programs, or initiatives that incorporates a sustainable approach into planning and decision-making. Using a tool that applies the pillars of sustainability can often be the first step to ensuring that sustainable financial goals are met alongside social and environmental considerations. Although the budgeting process is rigorous and allows for the democratic process to unfold, it leaves room for administrators and elected officials to miss opportunities for sustainable action.

Continue to improve the Solid Waste Division enterprise.

The recycling operation is just one part of the answer to a sustainable solid waste program in Peoria. It starts with the idea that more can be done to divert waste from landfills, and asks who are the stakeholders of solid waste and recycling in the City of Peoria? What do these stakeholders value, and how can their needs be met? Essentially, the largest group of stakeholders are the customers who expect quality service at an affordable price that is already being provided by the Solid Waste Division. But is it as accurate, precise, and efficient as it could be? Gathering customer feedback, improving customer experience, and reporting the results are simple but effective tools when engaging customers to think about their role in the organization. By creating a platform that customers are engaged in from their first experience to their last will improve the customer base and participation in diversion and contamination initiatives.

Develop a modernization plan that leverages data and smart technologies.

Modernizing the SWD has already happened in several key areas. The division has implemented new vehicles to improve efficiency and function. It has employed web tools for education and proposed software solutions for route optimization. Yet, modernization requires a comprehensive strategy to ensure compatibility when implementing new systems. Additionally, modernization needs to place people at the center, both in terms of design and function. It is typically more costly to develop technology solutions that are customized when compared to commercial off-the-shelf products, but if employees or customers find apps or devices difficult to use, then it may cost more in training or even repurchasing new systems. While this report recommends modernization, it also recommends more research into new solid waste technologies. Several cities have offered apps to customers for scheduling services or providing feedback (Agata, 2019). Others have installed sensors to monitor waste in high-traffic areas to reduce manual costs, time, and reduce environmental footprints (Agata, 2019).

CONCLUSION

The project began by asking what sustainable funding opportunities exist for a municipal recycling program. This report documents several initiatives led by the City of Peoria staff which were evaluated using sustainable funding criteria developed for this case study. Having met the conditions of these criteria across several initiatives or programs, the City of Peoria appears to be approaching sustainable funding in many ways. Still, the recommendations of this report were made to encourage the continued development of sustainable funding criteria to assess future funding of the program.

The definition of sustainable funding as applied through the criteria, however, is not enough. Policies intended to hold producers and consumers responsible are necessary for a circular economy that leaves no waste for future generations. This would also be a win for recycling programs as new revenue streams are introduced or source reduction occurs. By exploring new funding and development opportunities, Peoria takes yet another step toward accommodating its growing population in a sustainable fashion. It is the intent of this project to assist city leadership in the decision-making process when updating, augmenting, or simply reflecting on existing programs and systems.

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