Community gardens provide numerous benefits for urban populations such as access to organic and fresh produce, familiar vegetables and herbs not found in grocery stores, to social networks, and to physical exercise. Gardening is also conducive to emotional well-being and family bonding. However, the cost of water in a semi-arid, drought-prone region can be a significant impediment to non-profit organizations that manage gardens as part of their mission and service. Tucson has numerous community gardens located across neighborhoods in the metropolitan area. These include community gardens run by non-profit organizations and foundations such as Trees Please Arizona, the Dunbar Coalition and Primavera Foundation, an urban community farm run by the Community Food Bank of Southern Arizona, and several gardens at local schools.

This policy brief is based on a study conducted in partnership with the nonprofit, Community Gardens of Tucson (CGT), which manages 20 gardens across the city of Tucson. CGT’s gardens contain anywhere between 20 and 30 individual plots, each measuring 3 feet wide by 20 feet long; additionally, some gardens have raised beds to accommodate the disabled as well as picnic tables and seating areas. The gardens contain a mixture of vegetables, herbs, and flowers along with fruit trees – 28 of which are planted across 6 gardens. To help offset its operating expenses, and especially the cost of irrigation water, CGT charges an annual plot fee of $216, or $18 per month.

Over time, CGT has had to confront new financial challenges due to increased water usage stemming in part from climate change and associated rising costs of water. Water represents CGT’s second greatest expense after labor costs. This policy brief examines the impacts on CGT of Tucson Water’s pilot community garden water rate program and presents other initiatives led by CGT to reduce water use at its gardens. Finally, gardeners’ perspectives on water management are presented (for more on gardeners’ perspectives of gardening during COVID-19, see our research brief, available in April 2021) as well as a series of recommendations based on interviews conducted with CGT Board, staff and gardeners in 2020-2021.
Water is a scarce and precious resource in Southern Arizona. Tucson, with a population of 982,000 (Macrotrends 2021), is the largest city in Southern Arizona. With surface water only present after rains, Tucson depends on the distant Colorado River for its surface water supply. Water from the river is pumped 336 miles and 3,000 feet uphill to Tucson via the Central Arizona Project (CAP), with considerable energy and economic implications. Groundwater, while mixed with CAP water to avoid mineralization issues associated with Tucson’s hard water, is used less frequently to address the City’s water needs. Use of CAP water also supports the recharge of aquifers. Over-pumping, which emerged with the development of Tucson, continues to exceed natural recharge rates; this over-pumping combined with climate change impacts have caused a precipitous decline in the region’s water table levels.

Climate Central, an independent organization conducting research on climate change impacts, reported that between 1970 and 2018, Tucson and Arizona were the third fastest warming U.S. city and state. Tucson was an average 2.5°C (4.5°F) warmer in 2019 than in 1970 (2019). The National Weather Service, in turn, declared summer 2020 the hottest summer since 1897, when climate records were first documented in Tucson (Stormont, 2020; Tucson Mayor and Council, 2020). Without reductions in emissions, which contribute to increased atmospheric temperatures, Pima County could witness 100 days annually with 100 degree temperatures by 2060, and 130 days by 2100 (Gonzalez, et al., 2018). Equally important is that, based on current greenhouse gas emission rates, Arizona’s average monsoon rainfall could drop 30-40% by 2100 (Gonzalez, et al. 2018).

The City of Tucson’s largest water provider is Tucson Water, which provides the irrigation water used at CGT’s community gardens. In 2018, Tucson Water began the Community Garden Pilot Program to provide reduced garden irrigation rates to community gardens with installed garden dedicated water meters.

As is the case with urban farmers globally, most CGT gardeners are women. CGT also serves many low-income gardeners, including those from refugee communities. Even before the onset of the COVID-19 pandemic, Tucson – and its sister city, South Tucson – had higher poverty rates compared to other similarly sized U.S. cities (MAP, 2019). With the current economic crisis brought on by the COVID-19 pandemic, gardeners’ need for free or reduced plot fees has increased by 3%, with 77 reduced or free fee plots closing out the March pay period compared to 65 from last year. This, in turn, has placed an additional financial burden on CGT to cover a greater percentage of its plot fees, funding that had previously been dedicated to the organization’s labor and water costs.

Tucson Water’s subsidized rates provide an important entry point and intervention tool for community gardens to save money. In addition to providing reduced irrigation rates, these subsidies also exempt gardens from having to pay additional sewer fees.
For the period of July 2019 to the present (April 2021), the rate for community gardens to install a water meter dedicated to garden irrigation was $3.36/ccf. These reduced rates yield savings of approximately $0.74/ccf from the next lowest water rate and waive the system equity fee and the CAP water resource fee, for up to ¾ inch sized water meters. Taken together, these reductions can translate into potential annual savings of approximately $2,000 for a garden. The current cost to install a new ⅝ inch water meter and backflow prevention hardware starts at $4,100 and can be pro-rated over a four-year period (Tucson Water 2019).

Spring of 2021, Tucson Water will begin an evaluation of its pilot program, with the final report and evaluation being provided to the Mayor and Council. If approved, the program will likely be formally adopted and integrated into the new water rates.

CGT is part of Tucson Water’s pilot program, managing and administering to 20 gardens located across public, private, church, temple, and residential properties. With 244 occupied garden plots, CGT members are a heterogenous group with a diversity of food production experience which influences how water is utilized, managed, and conserved.

Community gardens include gardeners who have a range of purposes for gardening, including “hobby gardeners;” still, there are also many families and individuals who grow fresh produce to supplement their food, as well as some who gain an income by selling a portion to the market. Food insecurity in Tucson has always been great, but the COVID-19 pandemic significantly compounded the problem. Poverty and food insecurity are highly inter-connected. In 2019, Tucson’s poverty rate was 17.8% (MAP 2020), placing it second highest among 12 western cities, after El Paso, Texas (MAP 2019). Relatedly, in 2017, of 12 western metro areas, Tucson had the fourth highest food insecurity at 13.6% (Pullen 2020). Due to the COVID-19 pandemic and ensuing unemployment crisis that began in early 2020 and continues to this day, food insecurity rates have hit unprecedented levels, with 17 million more Americans affected in 2020 than 2019, particularly in households with children (Caspi, 2021).

The Community Food Bank of Southern Arizona, which serves Tucson and surrounding areas, reported from March 2020 through March 2021 there was a 25% increase in households served compared to the same period in 2019-2020 (Caspi, 2021). These data underscore the stress of COVID-19 on household food insecurity, due in part to job disruptions leading to increased hunger (insufficient food and nutrients) - particularly amongst female headed households, Black and Hispanic households, the elderly, and families with children (Machelor, 2021; USDA 2021). Thus, an investment in water for community gardens is also an investment in the well-being of Tucson’s residents.

Reducing water costs for community garden irrigation will improve the financial position of non-profit organizations managing these gardens which, in turn, will enable them to better serve their gardeners and the community.
ANALYSIS

TUCSON WATER COMMUNITY GARDEN IRRIGATION RATE

As noted above, after contracted labor, water is the largest operating cost for CGT. Of the organization’s 20 gardens, three currently have dedicated garden irrigation meters – Mansfield, Blue Moon (both installed in 2013 on city property), and Presidio (installed in 2019 on residential property).

Savings from the reduced water bills have allowed CGT to reallocate funds to build Tippy Taps and to scholarships for low-income gardeners, significant contributions during the COVID-19 pandemic. Gardens with irrigation water meters have also allowed for investments in projects such as pollinator plots and garden beautification to attract more gardeners.

For each garden, CGT negotiates a Memoranda of Understanding (MOU) with the property owner to work out irrigation payments. On sites where CGT reimburses a property owner for irrigation costs, having a dedicated irrigation meter saves more than $3.63/ccf on the sewer volume. For example, at its Presidio Garden, CGT saved $1824.90 in 11 months. Because sewer volume is calculated during the December to February billing cycle, should this be a period of active community gardening, the savings from this alone can be significant. One CGT Site Coordinator explained,

“We got the meter [at Presidio] because it is in a residential area and [previous to that] our water bill was ridiculous.”

Gardens lacking non-dedicated irrigation meters are also more likely to experience difficulties related to water usage and billing. For example, garden hosts sometimes make changes to MOUs with CGT when they experience increased water costs. Also, based on the requirements of meters for the pilot program, some gardens can be disqualified because of their infrastructural attributes. A Site Coordinator noted for one garden host’s case,

“They were having money problems...they decided to start charging us for water which they never have in the past...We thought it [installing a meter] would work, but the problem is...they have a bathroom so they have water. That disqualifies the garden because the water isn’t exclusively used for the garden.”
Water meters can be extremely beneficial in reducing an organization’s operating costs, yet they also represent a large financial investment. For installation of the meter/backflow infrastructure and pipes to one of CGT’s gardens, the organization paid $4,331.52, with payments of $90.24/month made for 48 months. A board member said, “The bottom line is that it was a big hit just to get a lower rate...there is that old saying that you have to spend money to make money, we had to spend money to save money.”

In arid environments, water can be just as important as the land and people who grow the food there. Numerous municipalities around the country financially support community gardens with water subsidies. In Saint Paul, Minnesota, for example, community gardens are supported by the Parks and Recreation agency as a realized contribution to stormwater drainage costs. In Vallejo, California, a participatory budgeting process allocated a portion of sales tax revenues to projects voted on by citizens. Through this process, $146,500 was dedicated to support community garden projects (Public Health Law Center 2017:16). Other localities offer grants that support urban agriculture, including community garden projects, many of which have been used to purchase inputs such as mulch, compost, and drip irrigation tape to help lower water use and costs (Growing Spaces 2021).

WATER CONSERVATION MEASURES

Some gardeners who previously have practiced urban agriculture in areas with much higher rainfall than Tucson have had to adjust to gardening in the desert. Others, have come from regions of the world whose climates are similar to Tucson’s. Because of Tucson’s semi-arid environment, CGT staff, Board, and volunteer site coordinators are highly attuned to water resource issues and the importance of conservation measures. A Board member expressed his understanding and concern over water issues, noting, “It’s clear we’re going to start seeing cuts from the CAP in the next few years as climate change cuts down the amount of water in the Colorado River. We need to get ahead of that in all different aspects of water conservation – including garden usage.” CGT has undertaken several initiatives to reduce water use in its garden plots. These have included both passive and active rainwater harvesting and management, drip irrigation and careful maintenance of these systems, shading, timely fixing of leaks, and the promotion of gardener composting and mulching. One gardener mentioned that he learns a great deal from CGT’s informational videos on mulching. Currently, CGT has four active rainwater harvesting systems and hopes to install more. Gardens at CGT with water harvesting systems generally use the water for supplemental irrigation and hand watering.

ORGANIZATIONAL PARTNERSHIPS

Multiple studies and programs related to Arizona’s urban communities have emerged out of a recognition of the growing scarcity of water available to the state. Many of these programs address different niches. For example, for the University of Arizona – Pima County Cooperative Extension SmartScape program, landscape and irrigation professionals are primarily targeted through workshops, classes, and trainings.
On the other hand, the non-profit, Watershed Management Group (WMG), centers education and installation work on community groups, like neighborhoods and schools. Both programs also offer residents education in English and Spanish, including on rainwater and greywater harvesting systems which are required in order to receive rebates from Tucson Water. Because many water related programs and studies (and, in turn, investments) focus on residential and commercial use of water, there is significant potential to increase water conservation work with community gardens. Many of CGT’s gardeners already participate in programs led by other organizations to supplement their knowledge about gardening in the context of the Sonoran Desert – which is as much a topic connected to water as it is about land, seeds, and gardening practices. Indeed, one of CGT’s core values, ‘Sustaining Our Environment,’ is that, gardeners “...use natural methods that help protect and preserve our environment and benefit ecosystems through organic gardening practices, creating pollinator habitats, and conserving water.” Water harvesting, composting, mulching, shading, low-water plant selection, and other forms of water conservation are important to community gardening. Many organizations already have such programming in place, and new collaborations with community gardens could promote even greater and more effective water conservation.

In summary, water is a significant cost to non-profit organizations managing urban food production, such as the Community Gardens of Tucson (CGT). Tucson Water’s community garden water rate, as well as other innovative and proactive municipal programs and policies, offers substantial benefits to our organizations who manage and administer the City’s rich fabric of community gardens. This rate lowers their operating costs which, in turn, facilitates investments in reduced or free plot fees; COVID-19 safety measures, such as handwashing stations; and conservation-related expenditures, such as educational programs on water conservation, composting, mulching and seeds for low-water requiring crops. With Tucson’s high poverty and food insecurity rates, which have only intensified under the current COVID-19 pandemic, urban gardening also offers low-income residents a way to gain access to affordable, healthy produce.

Interviews with CGT Board, staff, and volunteer Site Coordinators revealed a keen sense of awareness and concern about water related to current and future challenges of gardening in the Southwest. CGT’s gardeners validated these concerns and expressed the benefits of current and increased investments and education to support urban desert gardening. At a managerial level, additional fundraising activities and expanded networks with organizations who work in food production and water conservation could be initiated by CGT. COVID-19 has highlighted working across institutions is a key piece to not only saving both water and funding in times of scarcity or crisis but also to support an ever-increasing number of requests of assistance from vulnerable residents.

CONCLUSIONS
RECOMMENDATIONS FOR THE CITY OF TUCSON

- Continue the Community Garden Pilot Program and establish it as a permanent program of the City
- Consider increasing subsidies or fully subsidizing water to community gardens, prioritizing those who meet instituted low usage criteria
- Extend Tucson Water’s Community Garden irrigation rate to gardens with non-dedicated water meters
- For those applying for the special Community Garden irrigation rate, allow flexibility in amenities that are allowed on the garden site, particularly low-flow or composting toilets, and other infrastructure that facilitates use of the gardens by the elderly and those with children
- Provide free or reduced-price mulch to CGT from trees trimmed by the City of Tucson or contractors; provide free compost to CGT from the new composting facility at Los Reales to promote water conservation
- Increase City government investments in community gardens modeled on other municipalities’ programs, such as funding installation of irrigation water connections, and investing in other critical needs, such as bicycle racks and picnic tables, to promote greater sustainability and deepen social networks
- Make more city land available for community gardens with a dedicated water meter, fencing, and other needs provided to reduce costs, especially in low-income neighborhoods where residents request gardening spaces
- Involve City Ward offices in ongoing publicity for gardens
- Include Tucson Water community garden highlights as an insert in the Tucson Water bill to promote use of the subsidized rate and help community gardens fill untended plots

“The government could do more…make things more accessible for those who don’t have space, tools, or more resources – who want to participate in programs like this…but it can’t work if there isn’t enough water. We need to get more support, or benefits, or grants, or anything to make this system more available and viable.”

-CGT Gardener
RECOMMENDATIONS

FOR CGT

- Engage in targeted fundraising campaigns to gain better access to compost, soil, mulching, irrigation equipment and shade cloth

- Create an Adopt-A-Meter program to encourage donations for designated gardens to acquire water meters that facilitate access to the lower water rate

- Increase the portfolio of educational tools and programs, such as videos and photo brochures, on water conservation in Southwest urban gardening that is framed in the context of climate change

- Strengthen networks between programs that are focused on water, agriculture, conservation, urban environmental issues, and community gardens, such as with the University of Arizona Cooperative Extension Smartscape program which could dedicate part of its mission to targeting community gardens

“... especially in the summer people say there is not enough water. I say ok, there should be enough water...It is a trying place especially if you come from a place where it rains a lot... I try to say I’m right there with you and we’re all learning...”

-CGT staff member
REFERENCES


