

Rainwater Harvesting Living Laboratory

Grant Type

Annual Grant

Application Type

Final Application

Project Manager 1 Name

Selene Leyva

Project Manager 1 Status

Student

Project Manager 1 Email

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Project Manager 1 Department

Master of Public Administration, School of Government & Public Policy

Project Manager 2 Name

Caleb Ortega

Project Manager 2 Email

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Project Manager 2 Status

Staff

Project Manager 2 Department

School of Geography, Development, and Environment

Project Manager 2 Role

Co-lead

Project Advisor Name

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Project Advisor Department

School of Geography, Development, and Environment

Fiscal Officer

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Fiscal Officer Department Name

School of Geography, Development, and Environment

Requested Funding Amount

Only enter this number after completing the budget sheet (the budget template will round up your request).

Mini Grants may request \$250 up to \$5,000.

Annual Grants may request \$5,001 up to \$100,000, and up to three years of funding.

Year 1:

\$90000

Year 2:

Year 3:

Official Project Name

Rainwater Harvesting Living Laboratory

Primary Project Category

Water

Secondary Project Category

Social Sustainability (including Social/Environmental Justice)

Background and Context

Please provide relevant background about your organization/team including your mission and/or expertise. Lay out the rationale for the proposed project, focusing on the issue that your project would address. This section is meant to give us more information about you and the context for the project, while the questions below provide space to go into detail about your proposal's plan and specifics.

Response:

University of Arizona School Garden Workshop serves ~70 school gardens across the Tucson Unified School District, providing sustainability enrichment for approximately 40,000 PK-12 students. Across the 70+ schools supported by the School Garden Workshop, over 85% of the students qualify for the Federal Free and Reduced Lunch Meal Program. According to the Arizona Department of Education, School Garden Workshop supports 43% of the school gardens state-wide. The heartbeat of the

program is the School Garden Workshop internship course (GEOG 497F/597F) where upwards of 100 UArizona student interns per year are trained and provide approximately 10,000 hours of TUSD school garden support. On the national stage, the School Garden Workshop provides garden-based professional development training to over 800 school garden educators, and conducts ongoing funded research to inform policy and practice: <https://aeraselsig.wordpress.com/2023/02/06/social-emotional-growth-in-school-gardens/>

April, 2024, UA School Garden Workshop will break ground on a living laboratory and school garden training center at 415 N. Mountain Ave, 85719. The property is owned by the University of Arizona and is adjacent to Mansfeld Middle School and a 5 minute walk from the ENR2 building on campus, where the School Garden Workshop course is taught. The space will become the garden and sustainability living laboratory for the UArizona workshop course, for Mansfeld Middle School, and a professional development training site for K-12 teachers both regionally and nationally. School Garden Workshop has secured funding from Sprouts Healthy Communities Foundation to renovate two historic houses on the property to be used as instructional spaces, and is seeking investment from the Campus Sustainability Fund to create the Rainwater Harvesting Living Laboratory and demonstration site. The Rainwater Harvesting Living Laboratory will consist of both active and passive rainwater harvesting by collecting rainwater from across the property to support sustainable on-site agriculture. School Garden Workshop has deep experience in installing and activating rainwater harvesting infrastructure. Since 2009, School Garden Workshop has installed upward of 30 active rainwater harvesting cisterns across Tucson including at the nationally recognized Manzo Elementary School. Because of its proximity to ENR2, where the School Garden Workshop course is taught, the Rainwater Harvesting Living Laboratory will become a university asset as an on-campus training site for UArizona interns and a space for UArizona student interns to facilitate sustainability education to TUSD PK-12 students.

Project Description

Please provide a thorough description and explanation of your project. Be explicit in what your team is proposing. What are the goals of your project? What will your project's outcomes be? Outcomes should be SMART—specific, measurable, achievable, realistic, and timely. Describe how each objective will be achieved with the anticipated timeframes for each, including any key dates for when certain elements must start or be completed.

Response:

The Rainwater Harvesting Living Laboratory will be an on-campus sustainability training center for:
UA School Garden Workshop course and other interested UA groups
Mansfeld Middle School students
K-12 students from across the region attending field trips
Professional development for K-12 teachers from across city, region and nation

The properties at 415 and 417 N. Mountain Avenue are UArizona owned, and adjacent to both Mansfeld Middle School and the ENR2 building, where the School Garden Workshop course is taught. The project's practical location sits at the nexus of UArizona instruction and community engagement. Mansfeld Middle School students will activate the space through an existing partnership with two science teachers, with the support of UArizona School Garden Workshop interns.

Funding has been secured from Sprouts Healthy Communities Foundation to renovate both historic

structures on site, and an investment from the Campus Sustainability Fund will allow us to include sustainability infrastructure surrounding the buildings for both UArizona student instruction and community engagement. Funding will allow us to assemble a small leadership team consisting of 3 UArizona students, with the support of School Garden Workshop staff, to design and install a cutting edge rainwater harvesting system across the properties, capturing water from the two buildings' rooftops and water flowing across the landscape. The Rainwater Harvesting Living Laboratory will be sustainability in action, capturing rainwater for sustainable on-site agriculture, as well as a teaching facility for students and educators across the K-12 to university pipeline.

Timeline:

Fall 2023: Completed

- Obtained permission from UA Planning, Design, and Construction (PD and C) to occupy/renovate the two UA owned properties
- UA PD and C project manager assigned: mikeherman@arizona.edu
- Completed a feasibility study including hazardous materials inspections
- Consulted with Arizona State Historic Preservation Office for permission to renovate
- Secured funding from Sprouts Healthy Communities Foundation
- Secured contracts through UA PD and C for the architect and builder
- Conducted community informed design charrettes
- Completed conceptual drawings
- Presented to Rincon Heights Neighborhood Association to secure community buy-in

Spring 2024

- Submit plans from architect to builder
- Obtain cost break down from builder
- Raise money to fill funding gaps
- Complete UA permitting process
- Break ground on house renovations, April 2024

Fall 2024

- Identify student leadership team
- Conduct a Rainwater Harvesting Living Laboratory design process, including students from the School Garden Workshop course
- Finalize site plan for rainwater harvesting infrastructure

Spring 2025

- Install Rainwater Harvesting Living Laboratory infrastructure
- Project evaluation and reporting

Budget Narrative

Use this section to provide supplemental justification for the items you are requesting on your budget sheet. Please break down your justifications into the budget categories: Personnel or operating budget. Do not list out each expense or repeat notes made in the budget template, but instead address why the line items are being requested and the purpose they will serve, providing elaboration when necessary.

If you are requesting funding for personnel, use this section to elaborate on the position you are creating and how the budget and timeline was established for it. If you plan to hire students, describe in what capacity. Describe relevant details thoroughly (wages, responsibilities, duration of job, extent of involvement, how you will solicit/ market these opportunities etc.).

Ensure the descriptions match the line items in the budget sheet.

If matching or supporting funds are secured for the project, identify the source and amount in this section, and detail the impact of the matching funds on your overall budget.

Response:

Under personnel, funding is allocated for 156 hours for an existing School Garden Workshop program coordinator and December 2023 UArizona graduate Caleb Ortega. Fall 2023, as a UArizona student, Caleb worked on the conceptualization of this project. Caleb is now a School Garden Workshop employee and no longer a student, and will be our infrastructure project lead.

Also under personnel, we have allocated 40 hours for current UA graduate student Selene Leyva to help coordinate the UArizona student leadership. Selene is both a current graduate student and School Garden Workshop employee, and will be our primary Project Manager.

In addition to Caleb and Selene, three additional student workers will receive pay for 50 hours each for the duration of the project at \$20 per hour, in support of the design and installation of the Rainwater Harvesting Living Laboratory. Student workers will be recruited from across campus including but not limited to: School Garden Workshop Class, Guerrero Center, African American Student Affairs, Students for Sustainability, and the Arizona Institute for Resilience.

Funded personnel, both students and employees, collaborate to conceptualize, plan, budget, execute, evaluate, and report impacts.

Under the operating budget, we have requested \$78,800 for rainwater harvesting infrastructure and field supplies. Our student leadership team, with support from School Garden Workshop staff, will develop a site plan using this budget to create a model sustainability teaching site. Infrastructure will include seamless rain gutters, rainwater cisterns, berms and basins, dry-stack rockwork, and native plant installations. Field supplies will include landscaping tools and tool storage to facilitate ongoing hands-on rainwater harvesting workshops for both UArizona and K-12 students and teachers.

Regarding additional funding, a secured funding amount has yet to be determined. Sprouts Healthy Communities Foundation has pledged to cover the full renovation of both houses in return for the naming rights: Sprouts House. Gift agreement language is currently being passed back and forth between UArizona Foundation and Sprouts. Scope of renovations and project costs have not been finalized but first infusion of Sprouts funds should be transferred before the end of March.

Sprouts funding will only cover the basic renovations of both houses but not exterior sustainability features. Campus Sustainability Fund monies would be used to supplement the Sprouts funded renovations with rainwater harvesting features. In March, School Garden Workshop will begin a capital campaign to fundraise for additional gardens, an outdoor classroom, and a greenhouse.

Project Feasibility and Logistics

The Campus Sustainability Fund will only fund projects that have completed the necessary work to ensure they can succeed, be completed in the grant's timeline, or have an accurate budget.

Please provide a description of the work that has been completed so far to make this project feasible. Have all relevant partners been contacted/coordinated with? Have you received consent or authorization to complete your project (such as from Housing and Residence Life, Facilities Management, Parking and Transportation, etc.)? Please identify them in your response.

If you are making modifications to campus, do you have authorization or official quotes from Facilities Management to accurately identify the cost of labor and supplies?

Response:

See also Fall 2023, Project Timeline. Permission for the project has been granted by Facilities Management and Michael Herman from Planning Design and Construction has been assigned as the project manager. Arlette Cordery from the College of Social and Behavioral Sciences Strategic Projects has been assigned to support. Feasibility work completed to-date include:

Hazardous materials inspection

Consultation with State Historic Preservation Office

Architect and builder secured for structure renovations

Funding secured for renovations

Community design charrette and conceptual drawings completed

Environmental Sustainability Outcomes

Please provide a description of how you expect your project to advance environmental sustainability on campus. A definition of environmental sustainability is provided on our Guides and Tips page.

Response:

The Rainwater Harvesting Living Laboratory is the keystone to demonstrate and achieve closed-loop sustainable growing practices at the school garden training center by addressing the significant water needs to grow food in our region. UA School Garden Workshop has installed rainwater harvesting infrastructure in conjunction with school gardens at 30 TUSD sites, and these active and passive systems have resulted in significant reductions in water spending and use across sites. These systems allow us to strive for both water sustainability and local food resilience simultaneously, without creating conflicts between water conservation and growing food. By pairing these initiatives, our organization is better aligned with local sustainability initiatives such as the Santa Cruz River Heritage Project and the City of Tucson's Resilient Together plan. On-site rainwater harvesting systems serve as water storage and security for gardens, creating a dependable water source during all times of year and in extreme weather circumstances such as pipe freezes. Additionally, rainwater harvesting infrastructure provides benefits to soil health and integrity where runoff and erosion can be prevented through water capture. Considering the proximity of the school garden training site to residential streets, reducing runoff not only preserves the land, but decreases the flooding of adjacent roads which can contribute to ground source pollution.

According to National Weather Service Data, Tucson gets ~11.3 inches of rain annually. The approximate rooftop area from which rainwater will be collected onsite is 2,000 square feet, with potential to collect up to 25,000 gallons of water from rooftop catchment per year. The property as a whole (the area of the total property subtracting rooftop area) will collect an additional 4,300 gallons of rainfall a year, which will be captured and sunk through passive rainwater harvesting techniques. These passive systems will also accommodate overflow from the rooftop systems. Plastic rainwater harvesting tanks are inexpensive, lightweight, and resistant to corrosion, making them easy to transport and durable. However, they may be more susceptible to UV damage over time. Metal corrugated steel tanks can last for decades if properly maintained, however they must be built on a concrete pad, are more expensive, and require regular maintenance to ensure their durability. These types of considerations, including cost-per-gallon, will be put in front of the Student Leadership team as design constraints to facilitate informed rainwater harvesting design.

Social Sustainability Outcomes

Please provide a description of how you expect your project to advance social sustainability on campus. A definition of social sustainability is provided on our Guides and Tips page.

Response:

School Garden Workshop is committed to advancing social sustainability at every stage of our programming, from conceptualization and design, to installation and use. The school garden training center is the product of collective discussions and decision making between leadership across multiple stakeholder groups in the school district, the University community, and the local community. For over a decade, our program has operated at Manzo Elementary and focused on serving TUSD schools with greater than 80% enrollment in the Free and Reduced Lunch program and a high percentage of BIPOC youth. As we expand into more schools and grow our network, it has become more difficult to serve these students equitably without a programming hub that is in a more central location and unaffiliated with any one particular school or community. After securing funding for the centrally located school garden training space, we launched a series of design workshops with professionals from the Historic Preservation Society and UA students enrolled in our internship course. This guided “design charrette” process had both instructional and open-ended project components where UA students learned the principles of good garden design, then put that knowledge to work in designing a living lab space that would meet the physical needs for a garden and the multi-layered needs of the people who will be using the garden space. Just as in our school gardens, our program is firmly rooted in the belief that the best gardens are built by many hands, so we will continuously pull in UA students, TUSD students, and community members as we move through the design process and transition into the construction stages. The Rainwater Harvesting Living Lab is a component of the training center that will enrich the whole-system design and the experiences of the students and community members we seek to serve through this space. Although there are other rainwater harvesting demonstration sites across town, this is the only site to use a comprehensively inclusive design process that reflects a wide spectrum of diversity in our community—from the youngest of learners to seasoned professionals. This is also the only rainwater harvesting demonstration space to intersect specifically with school gardening and to target K-12 educators and students through university student engagement with an historically under-resourced population that faces myriad and unique obstacles in accessing and maintaining garden spaces. School Garden Workshop, a program that has existed for over a decade in close partnership with TUSD, has established place-based, community-based and school district-based expertise in this area, as well as an extensive network of educators who will see barriers to physical access removed and an increase in access to resources in topics such as outdoor learning, ecology integration, social-emotional learning, and food justice.

Student Leadership & Involvement

Please provide a description of how your project will benefit students on campus regarding the creation of leadership opportunities or student engagement. What leadership opportunities exist within your proposal? If you plan to seek student involvement, include relevant details thoroughly and how you will solicit/ market these opportunities.

Response:

Our project envisions a transformative impact on student life at UA by creating leadership opportunities and fostering student engagement. The process begins with the shared history of

Caleb and Selene, former UA undergraduate students who played a pivotal role in conceiving this grant project in Fall 2023. Fast forward to the present, Selene, a current UA graduate student, and Caleb, a December 2023 grad-school graduate, will serve as our leadership development lead and our sustainable infrastructure lead, making their roles emblematic of the project's commitment to continuity, student-driven impact, and professional growth. In the Fall of 2024, our project will take another step towards student empowerment by recruiting three individuals from diverse academic backgrounds to form our Student Apprentice & Leadership Team. The student apprentices will play key roles in shaping the project's trajectory by:

Engaging in personalized mentorship and targeted training sessions to develop skills for professional growth and project success

Assuming leadership in decision-making processes related to the project

Collaborating with team members, UA students, and community to manage installation design and processes

Contributing to the development and implementation of project evaluation tools

Simultaneously, 50 UA students each semester from the School Garden Workshop course will participate in the rainwater harvesting design charrette to generate ideas informing our team and student apprentices' decision making. The collaborative endeavor transcends traditional coursework providing college students with hands-on experience that goes beyond the classroom. Spring 2025, marks a practical phase of our project, with UA students enrolled in the course participating in installation workshops of both passive and active rainwater. These workshops serve as immersive learning experiences allowing UA students to gain skills in sustainable water solutions by learning the hardware and practical implementation processes. Advertising the opportunity for the Student Apprentice & Leadership Team will be shared via Handshake, SGW social media platforms, and through collaborations with existing student organizations. Additionally, the students enrolled in the UA course will have access to the Lab through weekly training sessions, allowing it to serve as a platform for hands-on learning and meaningful engagement. In essence, these opportunities serve as a transformative journey for UA students, shaping them into not just learners but active contributors to sustainable futures.

Education, Outreach, and Behavior Change

What opportunities does this project provide for members of the campus/community to learn about sustainability? How will your project educate the campus community and/or incorporate outreach and behavior change, particularly beyond the "sustainability choir?"

Please provide a description of how you expect your project will communicate its impacts to the campus community.

Response:

The Rainwater Harvesting Living Laboratory will create opportunities for UA and K-12 students across the region to engage in hands-on sustainability education. Through the UA School Garden Workshop course, approximately 100 students from across campus will receive ongoing training in the space. The School Garden Workshop course is cross listed in 10 departments, drawing students from beyond the sustainability choir, including:

American Indian Studies

Environmental Science

Geography and Development

Public Health

Latin American Studies

Nutrition

Plant Science

Science Teaching

Teaching, Learning and Sociocultural Studies

Teaching and Teacher Education

Beyond the internship course, School Garden Workshop has a history of collaboration with Guerrero Student Center, African American Support Association, and the Flowers and Bullets Collective. This space will be used to strengthen collaborative environmental justice programming with these groups and beyond.

Furthermore, the Rainwater Harvesting Living Laboratory is steps away from Mansfeld Middle School, and will serve as a hands-on sustainability learning space for Mansfeld students through an existing partnership with two Mansfeld Science teachers. Mansfeld serves approximately 1000 students with an 83% non-white student population, 60% of whom receive Federal Free and Reduced Lunch. Mansfeld, though just steps away from UA, serves a community systemically cut off from the benefits of the university system. The vision of this project is to produce a feedback loop of UA students providing sustainability enrichment to Mansfeld students, opening the K-12 to university pipeline, where Mansfeld students attend the university and have the ability to return to their community to provide enrichment. This feedback loop is more than aspirational, after ten-plus years of programming, the School Garden Workshop is seeing TUSD students who engaged in school gardens take the workshop course and return to their childhood schools as school garden interns. The Rainwater Harvesting Living Laboratory will produce behavior change by exposing students to the green infrastructure needed to address climate change. Rainwater harvesting infrastructure connects learners to the seasonality of rain in the Tucson Basin, and the inconsistency of those rains due to climate change. Rainwater harvesting also produces a conservation ethic towards water. Using harvested rainwater teaches students that water is a finite source, and creates an acute awareness of water usage. The site will include interpretive signage to support its educational function, as well as funding recognition signage opportunities for CSF.

The School Garden Workshop conducts ongoing program evaluations and publishes an annual impact report. Next year's report will capture outcomes for the Rainwater Harvesting Living Laboratory, and will be disseminated across campus, to our advisory board, and to all of our program supporters.