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Community Gardens as Places for Ecological Caring in Action

By Amal Ibourk, Lauren Wagner, Deb Morrison, Syrena Young, and Justin Milledge

ABSTRACT

Current and future Science, Technology, Engineering, Mathematics, and Medicine (STEMM) students must grapple with one of the most pressing scientific issues of the century: climate change. Teaching about climate change with our youngest learners requires preparation, and planting roots to foster growth, innovation, and sustainability. Building a community garden with elementary students is a way to act towards climate justice as it reminds us about how all living things are part of an interconnected system. This article describes a fifth-grade climate change action project that was part of a unit that aligns with the state science standards and the Next Generation Science Standards (NGSS), focused on how science learning can be used to protect the Earth's resources and local environments. The anchoring phenomenon and lessons of the unit highlighted the annual migration of the monarch butterflies, a local endangered species and phenomenon. By planting milkweed in the garden, students learned about migration, life cycles, greenhouse gases, and the survival of monarch butterflies. This article provides educators with ideas and practical suggestions for building a garden and an overview of how the project can be implemented within a school community.

Keywords: 3–5; K–12 Framework; NGSS; obtaining; evaluating; and communicating information; Earth systems/ weather; environmental change; physical changes; systems and system models; asking questions and defining problems

Learning is like a garden, each plant grows from its roots, and yet collectively the plants are all part of a collective place and time—they are a community. Teaching and learning about climate change grounded in principles of equity and justice requires careful planning and tending to foster quality harvests that are sustainable year after year. We need to ensure that the design and seeding of our garden—our learning environments—is well thought-out and resourced, that our soil—our educators, families, and communities—is rich and nourished, and that our plants—our students—are loved, supported, and fostered depending on their specific needs. The design, planting, tending, and harvesting of climate change learning in our garden year after year needs to include sustainable practices to inform

the shifting patterns of our social and ecological landscapes.

Climate change is perhaps the most critical 21st-century scientific issue facing today's science students and tomorrow's Science, Technology, Engineering, Mathematics, and Medicine (STEMM) workers. According to the National Research Council (NRC), anthropogenic climate change, or climate change that humans cause by burning fossil fuels such as coal, oil, and natural gas, “poses significant risks for a broad range of human and natural systems” (2012, 2). Providing climate science learning for all students requires a pedagogical approach that anchors learning in local phenomena and fosters student inquiry practices (Learning in Places Collaborative 2023; Patterson Williams and Gray 2021).

For younger children, learning about climate change can be anxiety-inducing (Palinkas and Wong 2020). For educators, teaching about climate change is complex and challenging. And yet, to address anthropogenic climate change we need everyone in our society engaged in science-informed climate mitigation and adaptation efforts. Thus, we need climate change education to be happening at all grade levels and be reaching into our families and communities (Morrison et al. 2020). So how then do we meet families and communities where they are to create age-appropriate, scientifically rich, and community-contextualized climate learning experiences?

Building a community garden is a way to engage in climate justice from an ecological care perspective. Gardening provides a connection for all



involved and allows us to learn how all entities, human and more than-human, are related and interconnected in mutually reciprocal, interactive, dynamic, and always-becoming relationships (Pugh et al. 2019). Students learn about how humans are part of and connected to the natural world and that we depend on healthy ecosystems for our own health and well-being. By gardening we can begin to address socio-ecological harm (e.g., endangerment of species due to habitat loss) by planting seeds of hope; it is a way to engage in mitigating climate change and teach-

ing about ecological justice from a multi-species perspective.

SOCIO-ECOLOGICAL SYSTEMS APPROACH TO TEACHING AND LEARNING

A climate justice-centered approach grounds learning around anchoring scientific phenomena in the everyday experiences of teachers and their students to build empowerment as climate change problem solvers (Morrison et al. 2020). Achieving authentic student engagement involves present-

ing phenomena that speak to the lived identities of students. They must see themselves in all stages of the work from problem definition to solution generation; their voices should be encouraged and validated throughout the learning activity.

Elementary educators across the nation are building educational resources that attend to specifically understanding complex socio-ecological framing of learning around time scales of change across a place and connecting places to community histories as ways to do justice work. The Learning in Places (LIP) Framework provides a framework that positions humans as part of natural systems (Bang and Marin 2015; Cajete 2000; Learning in Places Collaborative 2023; Medin and Bang 2014) allowing to reason about patterns in the Earth's climate in relation to human and non-human entities.

CULTIVATING OUR GARDEN

In our work, we drew on these lessons from elementary-based socio-ecological learning to inform learning design for a community garden centered on monarch butterfly migration as a phenomenon. The garden was planted in a rural elementary school in the Southeastern part of the United States and was part of a three-week climate change fifth-grade curriculum unit that aligns with the state science standards and the *Next Generation Science Standards* (NGSS; NGSS Lead States 2013). State standards connections are built around the science standards for the big idea of interdependence, where students come to an understanding of how human activities and natural events can have major impacts on the environment and recognize the interconnectedness of humans with all entities (Bang and Marin 2015; Cajete 2000; Learning in Places Collaborative 2023; McGowan and Bell 2022; Medin and Bang 2014). Within the context of the NGSS, the unit aligns with performance expectation 5-ESS3-1,

“Obtain and communicate information about ways individual communities use science ideas to protect the Earth’s resources and environment.” By the end of the unit, the learning goal was to have fifth graders able to identify ways that humans can positively impact their environment, such as reducing food waste, decreasing energy usage, and planting plants to help native species. As an assessment, the students wrote a letter to their principal explaining why they should create programs and initiatives in their county to help slow global warming and supported their claims with evidence about why the programs (like using fewer cars) would help mitigate the effects of climate change. Such real-world examples of assessment help to develop students’ civic engagement practices in conjunction with their science learning (Van Horne et al. 2016).

We grounded the anchoring phenomenon of the climate change unit around endangered species in the local areas, specifically monarch butterflies, as their migration is seen along the coast. Students learn that the decline in the monarch migration is affected by the rising global temperatures over time, which has led to habitat loss for the monarch butterflies such as the decrease in the amounts of saltbush along the coastline. The nearby wildlife refuge is also an important stop for monarchs during their journey, as during the spring the butterflies feed on the nectar from the saltbush in the area.

Our community garden was part of the students’ climate action project, as they not only planted flowering plants for butterflies to get nectar but also milkweed for monarch larvae to feed on. It was also an opportunity for the students to develop climate change empathy in relation to the monarch butterflies and to connect climate change to the deforestation happening in their community and help them understand that further allowing deforestation puts biodiversity, the lives of those living in their communities,

and the global climate at risk. Gardens can slow future warming by reducing greenhouse emissions. Also, gardens help divert food waste from landfills when composting is included.

The planting of the garden in the school’s courtyard as a community resource was also part of our collective hope to help mitigate the effects of climate change and address socio-ecological justice from a multi-species perspective. The teacher commented, “Adding a garden and planting milkweed at our school which has not been done before... has also allowed students that maybe feel like they do not have a part to play in science a new connection to the monarch and the effects of global warming in [our community].” The teacher and students were featured in a news article in their local newspaper; below are examples of students’ reactions and thoughts about the unit that were published in their local newspaper (Lilly 2023). One student commented, “The unit was so interesting! I loved getting to learn so many new things about butterflies and how to help their numbers go up! I hope we can put this knowledge to good use.” Another said, “The most enjoyable thing about the butterfly unit was learning about how they migrate to Mexico and about how they reproduce.” While a full impact analysis of the work will be done after multiple iterations across the next few years, these early reflections help us to see what is working well in terms of teacher support and students’ learning.

GROWING IN COMMUNITY

To develop the garden, we partnered with the Environmental Service Program at the local university in the area. For materials, we used mostly second-hand and donated materials. We opted to create the garden out of wood pallets we got for free from a local plant nursery. The soil was collected from the city’s waste management, which gives away free mulch and compost. This process took about two months in total

to find all our materials at a discounted rate. We found that the process of developing a community garden doesn’t have to be as expensive as one may suspect.

With the assistance of the Environmental Service Program at the university, we created three gardening beds out of wood pallets and planted various plants including native milkweeds. Planting milkweed attracted pollinators such as monarch butterflies to the garden. The garden took about three hours in total to create, and the students were left with a real-world example of how they can make a change today regarding the climate crisis. The students were very excited to be making a positive impact and were watering the garden every day during recess. They were helping the monarch population thrive by providing a habitat right at the elementary school.

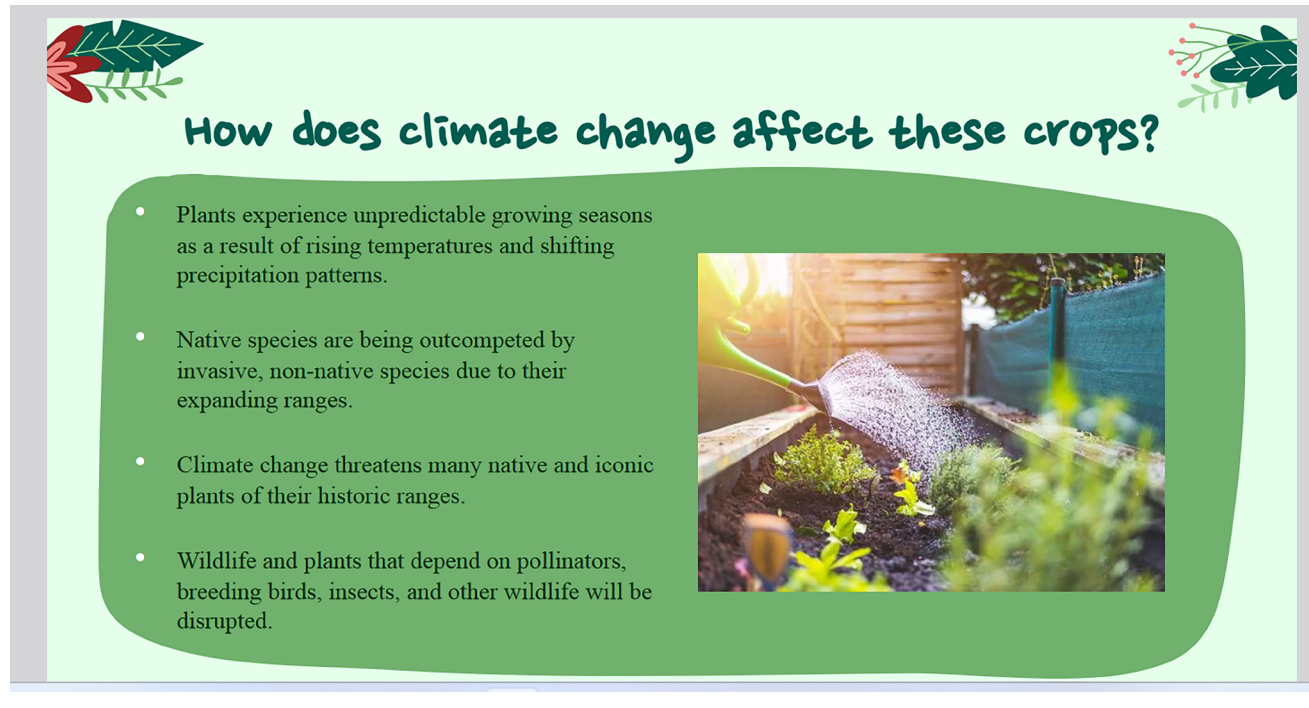
GROWING YOUR OWN GARDEN

Prior to planting a community garden, we suggest a checklist and a lesson overview that includes why planting a community garden is essential. During the pre-lesson, students will consider the question of why planting a community garden is a solution to mitigating climate change (Figure 1; see Supplemental Resources).

Try to block time during your teaching to have students participate in the planting of the garden. If that is not possible, you can plan it on the weekend and open it up so that parents can also be part of the community garden planting. Students gain an in-depth understanding of how humans, and pollinators (such as the monarch butterflies), are all connected to one another through the process of pollination, and how humans can both positively and negatively affect the process. Finally, we suggest having a debrief with students about their role in the community garden and encouraging them to write a story about it.


FIGURE 1

An excerpt from the overview presentation on gardens.



How does climate change affect these crops?

- Plants experience unpredictable growing seasons as a result of rising temperatures and shifting precipitation patterns.
- Native species are being outcompeted by invasive, non-native species due to their expanding ranges.
- Climate change threatens many native and iconic plants of their historic ranges.
- Wildlife and plants that depend on pollinators, breeding birds, insects, and other wildlife will be disrupted.



Working in gardens allows students to gain a greater understanding of nature, as well as the historical roots of gardening, and helps them develop a positive relationship with food and the importance of healthy ecosystems. Being part of a community garden and framing around the idea of multispecies and an endangered species like the monarch butterfly allows students to see themselves as interconnected to the world around them and be part of a community of good. Engaging in place-based and local phenomena allows students to see themselves as participants in science (Bang and Marin 2015) and how they can have a positive impact to better meet the needs of living things (Ende et al. 2023).

ENGINEERING AND GARDENING

The use of an irrigation system is beneficial when creating a garden that will be used in a school as it aids in limit-

ing the general maintenance that the garden will require. How can students address the problem of how to make sure the garden is properly watered and nourished when they are not there? You can engage students in engineering an irrigation system that they can design to water their community garden. Once students have modeled their own design, you can then model for them an irrigation system that they can use in their community garden. To create a simple yet effective irrigation system out of recycled materials, you would only need two-liter or 16 oz water bottles, a hammer, and nails. Using a sharp edge, cut off the bottom half of a water bottle leaving enough room to comfortably fill the container with water. Use nails to hammer holes into the top of the water bottle opener and screw the cap back onto the cut bottle. Then fill the water bottle with water and put it in the ground near the desired plants that need to be watered.

This bottle acts as gravity water irrigation. The water slowly disperses down to the plant leaving for a simple and easy irrigation system. This process is a great way to get students thinking about what exactly engineering is and how it can be used in everyday life.

CONCLUSION

As we establish roots and grow our learning about climate change, the design, planting, tending, and harvesting of our garden year after year will adapt and shift depending on our environment. Throughout this cycle, students become part of a relational system of care and nurturing of an interconnected community. As a result, they can understand how this allows us to respond to the world around us with much more awareness of socio-ecological justice of multispecies, empathy, and compassion. We need socio-ecological balance. Like in gardening where all plants need to work with each other and not com-

pete, we need to build interconnected relationships between all parts of our learning ecosystem, knowing that each part contributes its life, beauty, and resources to the whole, and in doing so we foster collective hope and care for our environment.

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SUPPLEMENTAL RESOURCES

We have shared the following materials online:

Checklist for Creating a Community Garden

https://docs.google.com/document/d/1zgZxIB6ZEQrEaYOLly6Bk_pK3ZQLpuxySgNgeeVt4nl/edit

Climate Change and Community Gardens PowerPoint Lesson

https://docs.google.com/presentation/d/1dLV_6MXIQcoEJ9FzL4wFy9ruRHct_SLASHLJFDDfLo/edit#slide=id.p3

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