Sustainable CU Large Grant Program: Science Discovery Garden Project

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Project Description

CU Science Discovery requests Sustainable CU support to develop and build a new teaching and demonstration garden near its facility on East Campus. Housed in the Science Learning Laboratory at 3400 Marine Street, CU Science Discovery directs numerous K-12 science education outreach programs, including a summer and after-school science class program that reaches more than 2,000 students annually. Each year, Science Discovery coordinates more than 250 classes spanning a wide variety of disciplines – from physics and chemistry to digital photography and the science of music. Despite its extensive class offerings, however, Science Discovery has previously not been able to offer many classes in the field of plant biology. Although Science Discovery offers several field ecology classes, the program has not yet offered any plant science classes on campus, despite the level of student interest in this area and our close proximity to the East Campus greenhouse.

The proposed garden will address this issue and enhance our class program with new plant science classes, while simultaneously addressing the University of Colorado – Boulder's goals of developing a green campus and educating a more environmentally literate campus community. Currently, an empty plot of land exists directly to the west of our building and we have been working with CU's Office of Planning, Design and Construction to evaluate the area's potential for a small educational garden. Together with Richelle Reilly, RLA, Campus Landscape Architect, we have identified two adjacent areas in which to install a 10' x 10' demonstration garden (in an existing bed that is already irrigated) and a 10' x 20' raised garden bed. Given its proximity to the Science Discovery building, a nearby water source, and an easily accessible parking lot, the site is an ideal location for an education garden.

Project Timeline

If funded, we will initiate the garden design process in March 2011, working with CU's Office of Planning, Design and Construction to design the garden and solicit bids from standard contractors. The garden will be installed and prepped for planting in April 2011. Science Discovery staff will work with undergraduate volunteers to prep the soil, purchase seeds, and depending on the type of plants, begin growing seedlings for the garden. We will also offer an initial garden class during our spring after-school class session (April-May, 2011), in which students will test soil and grow seedlings for the new garden. During our summer class session (June-July, 2011), we will offer eight new classes that will utilize the garden, each meeting for at least one week during the summer. In addition, the new garden will enhance our existing introductory beekeeping class ("Secrets of the Hive"). Detailed class descriptions are provided in Appendix A. Combined, these classes will impact approximately 180 students ages 6 and up.

March 2011	Design garden; Solicit contractors' bids
Mar-April 2011	Install garden
April-May 2011	Run one after-school Plant Science class (up to 15 students)
June-July 2011	Run nine plant-related classes (with a total of 13 class sections)
Fall 2011	Run one after-school class (15 students), culminating in fall harvest
2012 and beyond	Continue offering plant science classes during after-school and summer class sessions

Scope and Feasibility

The Science Discovery Garden will be a collaborative campus effort involving, in addition to Science Discovery staff and students, the CU Office of Planning, Design and Construction, Facilities Management, and the CU Environmental Center and its associated student groups (e.g., CU Going Local). If funded, we will work with the CU Office of Planning, Design and Construction to design the garden, solicit bids from approved contractors, and oversee the garden installation. Once the garden and its irrigation system are installed, Science Discovery will work with undergraduate student volunteers to prep the garden for spring planting.

This project is highly feasible because it capitalizes on the skills and expertise of the CU organizations involved. CU's Office of Planning, Design and Construction and the Campus Landscape Architect are experienced in installing these types of gardens. Science Discovery is a well-established organization that has provided high quality science education programming since 1983. Science Discovery is well established at its current location in the Science Learning Laboratory and will be able to provide continuing oversight for the adjacent garden. Our network of student employees and access to undergraduate volunteer groups will enable us to maintain the garden over time, and the programming infrastructure that we have in place will allow us to reach large numbers of K-12 students through the classes we design and deliver annually. The CU Environmental Center is connected to an undergraduate student group (CU Going Local) interested in local gardening efforts, which will be a source of undergraduate gardening volunteers. Because of Science Discovery's stability, the garden will continue to be used as an educational site for many years, maintained and used by Science Discovery staff and students, as well as other interested CU community members.

Figure 1. Sites identified for 10'x20' education garden (left) and 10'x10' demonstration garden (right). The two sites are adjacent to each other and to the Science Learning Laboratory.

Environmental Impact

As an organic garden free of chemical pesticides, the Science Discovery garden will exemplify the principles of CU's Blueprint for a Green Campus. The CU students and staff working at the garden, as well as the K-12 students taking classes at the garden, will learn about the importance of organic gardening and buying locally grown food. In addition, the Science Discovery garden will incorporate a worm compost system that will produce rich fertilizer while enabling participants to compost garden vegetation. CU staff working at the Science Learning Laboratory and other nearby campus buildings will be encouraged to compost their food scraps as well.

Additionally, the Science Discovery Garden can play a role in CU's Environmental Literacy initiative. CU's Blueprint for a Green Campus promotes environmental stewardship and sustainability practices among all campus community members. The Blueprint emphasizes the importance of educating all staff and students so that all have a basic understanding of environmental processes and the role that they as individuals play in these processes. The Science Discovery garden can play a role in CU's environmental literacy initiative, helping to educate students and staff about organic gardening, composting and conservation.

Student involvement

Science Discovery's garden project will involve students in all aspects of the project, from design and development to the science outreach classes that will utilize the space. University of Colorado students, including Science Discovery student staff and volunteers recruited through the CU Environmental Center (e.g., CU Going Local), will assist in the early development of the garden and will contribute to its ongoing maintenance once it is in place. Additionally, CU graduate and undergraduate students will play the lead role in developing and teaching new plant and insect-related classes that will use the garden. (Science Discovery hires approximately 50 instructors during the summer, the majority of whom are CU students.) This project will also impact a significant number of K-12 students (CU's future students!) – approximately 180 students ages 6 and up in year 1 and even more students in subsequent years. The Science Discovery garden will also be available for other undergraduate and graduate classes to use, as appropriate.

Social Equity and Environmental Justice

The new garden will enable Social Discovery to offer a variety of plant science and gardening classes to a wide variety of K-12 students coming from different backgrounds. Environmental education is important for all students, but may be particularly critical for students from low-income and minority populations that are often disproportionately affected by environmental degradation and pollution. Science Discovery educates a wide range of students across the K-12 spectrum and offers special scholarships for students who would not otherwise be able to afford our classes. In addition, we partner with community organizations, such as MESA (Math, Engineering, Science Achievement) and the I Have a Dream Foundation, both of which work with economically disadvantaged students, to make these hands-on science experiences more accessible for a wide range of students coming from all backgrounds. Through their participation, these students will learn important environmental principles related to ecosystem health and species coexistence. K-12 and university students will gain a greater appreciation of organic gardening and the importance of locally grown produce.

Innovation

The Science Discovery garden is an innovative and collaborative campus project that addresses the goals of both Science Discovery and the broader CU campus to increase environmental literacy. The new garden will be a new green space on campus, available to educate K-12 and university students and staff about fundamental environmental issues. The project will leverage Sustainable CU funding and develop a new garden site that will be maintained over the long term by Science Discovery.

Budget

Science Discovery requests **$9,293** to develop the new garden site, including $8,500 for garden design and construction (in collaboration with the CU Office of Planning, Design and

Construction and the Campus Landscape Architect) and $793 to cover the costs of necessary equipment and supplies, such as gardening tools and a worm compost system. (See attached Budget for more detailed budget information.) Science Discovery will contribute **more than $1,000 in match funding** to cover initial costs in year 1, such as planting materials, gardening gloves, and a student worker. In subsequent years, Science Discovery will cover the costs of operating the garden; these funds will come from student fees associated with the plant science classes. The campus will benefit from a small savings in not having to maintain the area once that responsibility has shifted to Science Discovery. In addition, the campus could potentially see revenues from sustainability classes that could utilize the garden space.

Project Longevity

Following Sustainable CU's initial investment to build the garden and acquire the necessary maintenance equipment, Science Discovery will maintain the garden and utilize the space for educational programming for many years to come. Science Discovery will offer at least one plant science class in each of the fall and spring after-school class sessions and will offer up to ten different plant/insect/gardening classes (some with multiple class sections) every summer. Science Discovery will support a student employee to oversee care and maintenance of the garden during the non-winter months. Gardening tools and planting materials needed in future years will be purchased by the Science Discovery Class Program, which will acquire the funds through student fees.

DETAILED BUDGET

Garden Design and Construction	**Needed**	**Requested**	**Science Discovery Match**
Project Design & Review	$1,300	$1,300	$0
Garden Construction	$7,200	$7,200	$0
(10'x20'x24" raised garden built w/ untreated timbers, lined w/ weed mat, irrigated w/ drip or spray, filled w/ plant mix)			
Equipment & Supplies			
Garden Cart	$100	$100	$0
Wheel Barrow	$125	$125	$0
Steel Rake	$25	$25	$0
Garden Hoe (2 @ $20 ea.)	$40	$40	$0
Shovel (2 @ $25 ea.)	$50	$50	$0
Trowels (6 @ $10 ea.)	$60	$60	$0
Pruner Shears (2 @ $15 ea.)	$30	$30	$0
Garden Hose	$40	$40	$0
Hose Cart	$30	$30	$0
Hose Spray Nozzle	$15	$15	$0
Soil pH Meter (2 @ $14)	$28	$28	$0
Soil Additions	$100	$100	$0
Planting Materials			
Kids' Gardening Gloves	$300	$0	$300
Seeds	$100	$0	$100
Starter plants	$100	$0	$100
Worm Composting			
Worm Bin	$110	$110	$0
Worms	$40	$40	$0
Garden Maintenance			
Student worker (annual support for ongoing maintenance)	$526	$0	$526
(2 hrs/wk @ $10/hr for 6 months/yr + benefits)			
Undergraduate volunteers	$0	$0	$0
TOTAL	**$10,319**	**$9,293**	**$1,026**

TOTAL REQUEST	**$9,293**
TOTAL MATCH	**$1,026**

(In addition, Science Discovery Match will include ongoing garden maintenance and materials/supplies for future educational programming)

Appendix A. Descriptions of NEW Summer 2011 Plant Science and Gardening Classes

Botanicals – A Field Class
Come enjoy the plant world with us. In this class we'll learn basics of botany including plant parts and their jobs, how plants grow and develop, and different plant life cycles. We'll also spend time learning how plants relate to bees, birds, and butterflies. Along the way, we'll take careful notes, diagrams, and plant pressings in field journals. At the end of the week we'll take a trip to the Denver Botanical Gardens, where we'll take a guided tour of the Gardens and learn about the role and importance of plants in our lives.

Designing for the Future: An Introduction to Permaculture
If you have looked at a piece of land and thought, how can I make this space beautiful, productive and sustainable, look no further, permaculture is the answer. Permaculture is a framework for designing ecologically-based design systems. It incorporates all aspects of human interactions with our surroundings, considering natural building, growing our own food, restoring contaminated lands, catching rainwater, utilizing native plants and so much more. In this class, students will be introduced to the basics of permaculture design. Toward the end of the week, students will work together to design a 1/4 acre urban plot using the techniques they learned in the beginning of the week. They will leave with the knowledge needed to comprehensively look at common challenges in our urban environments and design positive solutions through the permaculture looking glass.

Gardening 101
Do you ever wonder where your food comes from or how it grows before it makes its way to the grocery store? If you don't mind getting a little dirty, this class is for you. In this class, students will walk away with the knowledge to start and maintain their own healthy and vibrant garden. Students will be able to select the right spot for their garden, understand the relationships of the billions of organisms in soil, choose the right plants for their spot, be able to identify beneficial bugs and create healthy snacks and teas from their garden veggies. Students will design and build different types of gardens, make compost and compost teas, explore worm habitats, make salsa, release beneficial insects into the garden, and leave the class with their own transplants and seeds to grow at home.

Incredible Edible Plants
Growing all around us are fruits, shoots, roots and salad greens. Come explore the incredible edible plants growing in your own backyards. We'll consider many aspects of edible plants including how to find, identify, collect, and prepare different edible plants. We'll learn about the historical uses of plants by older generations. You will learn about the major edible plant families of the world including potatoes, rice, beans, cabbages, sunflowers and apples. We'll discover edible plants that we thought were just weeds. You'll never look at dandelions the same way!

Mysteries of the Garden
Gardens have been an inspiration for artists, poets and musicians throughout history. Join us in exploring our gardens and discover the creative naturalist inside you. In this class, students will use the garden and additional materials to create multiple pieces of art. Students will create a journal that will be used for writing poems, songs, writing observations, and more, throughout the class. We will also explore where our food comes from and why it is important to support our local farmers. Since Native Americans cultivated this land for hundreds of years, students will learn about Native American traditions and food culture. We will then harvest produce from our garden and make yummy, healthy snacks that students can make at home. Students will also explore the wonderful world of herbs and make soap, tea and a salve to take home.

Plant Pioneers and Weed Warriors – Field Class
Have you ever wondered what plants live around your neighborhood? Impress your friends and family by learning to identify many local species of plants in the area! We will spend the week learning about the plant life cycle, plant art, invasive species, and many other ways that plants are important. We will visit a special research site in the mountains to learn about invasive weeds and how to control them. Did you know that many of the food and medicines we take come from plants? We will visit an organic farm and learn how to grow food and why agriculture is important. We will also visit plant science research facilities at the University of Colorado. By the end of the week you will be a true weed warrior and plant pioneer! This class is a collaboration with INSTAAR, The Institute of Arctic and Alpine Studies, and funded in part, by the National Science Foundation.

The Science of Dirt
Have you ever wondered what lives in the dirt you play, plant, and dig in!? This class explores the microorganisms that call the dirt around the world home. We will explore samples from Colorado, the Rocky Mountains, Utah, Antarctica, and even your own backyard! By the end of the class, you'll have explored microscopy, species identification, and be able to tell your friends about all the creatures that live in the dirt!

Secrets of the Hive I
In this class, we will investigate one of the world's most fascinating creatures, the honeybee! Peering into real hives, we'll get to explore the biology and social organization of this amazing insect. By examining its unique anatomy and physiology, we'll consider how the honeybee's body can make wax and honey. We'll get to look inside the nursery (brood frames) to get a close up look at the honeybee's life cycle. Through hands-on activities, we'll seek answers to a lot of questions: Why do they sting? How do they navigate between sources of nectar and the hive?

Secrets of the Hive II: Advanced Beekeeping
Students work with several types of hives, and learn about splitting colonies, capturing queens, native "stingless" bees, hive maintenance and extracting honey. The advanced beekeeping course is for students who have taken the first *Secrets of the Hive* course and want to further their exploration of bee culture and expand beekeeper practice.

Department of Facilities Management
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February 15, 2011

Stacey Forsyth
Director
CU Science Discovery

Dear Stacey,

Thank you for contacting the office of Planning, Design & Construction to discuss a potential garden at your building. The area you have mentioned is an area that would work well for this use. It has great exposure, is close to existing irrigation and will assist with turf reduction in the area. As I understand the project, you will have the gardens built and then use them as a teaching opportunity for the students in your program.

This is an excellent idea for this location and should generate a lot of interest within your program. I am looking forward to its inception.

Please let me know if you need additional assistance.

Sincerely,

Richelle Reilly
Campus Landscape Architect
Office of Planning, Design & Construction
303 492 3500