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2018 IES Greenbelt Restoration and Environmental Education Network Project

Final Report
September 2018

THE TREE PROJECT
ENERGY • WATER • AIR • CARBON

Institute for Environmental Solutions

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2. Executive Summary

The 2018 IES Greenbelt Restoration and Environmental Education Network (GREEN) project took place in the Wheat Ridge Greenbelt, west of the Kipling Street Greenbelt entrance. It was a collaboration among IES, the City of Wheat Ridge Parks and Recreation Department (WRPRD), and Kullerstrand Elementary School. The project was made possible through generous funding from the City of Wheat Ridge Outside Agency Fund, Patagonia Denver, and the Community First Foundation.

Kullerstrand students, WRPRD employees, and IES Associates and Tree Stewards participated in a planting day on April 30, 2018.

The 2018 GREEN project marked the final year of a three-year project developed between IES and WRPRD to restore native plant species along the new Greenbelt trail. The original planting plan was designed by Andrew Rasmussen, a University of Colorado, Denver, Master of Urban and Regional Planning student and was modified by IES Associate Sabrina Kleinman. The plan built on the success of the 2016 and 2017 IES GREEN projects to prevent stormwater runoff and erosion along Clear Creek. IES worked with the Kullerstrand Elementary School's Teaching Responsibility And Independence with Learning Supports (TRAILS) teachers and staff members to develop a program to teach the TRAILS students and their general education peers the importance of trees to the urban environment and how to plant and care for native trees and shrubs. The program gave TRAILS students the opportunity for outdoor environmental education while working on social integration with adults and peers. Wheat Ridge Parks and Recreation Summer Sun Camp children participated in the Tree Ambassador program, where they watered the shrubs from the 2017 GREEN project site and removed nearby invasive weeds.

This report provides project origins, planning, processes, implementations, and outcomes. It discusses project goals, objectives, stakeholders, and stakeholder contributions. The design and implementation of the project is described in detail to serve as a model for future projects. The report also provides an evaluation and recommendations for future projects.

The 2018 IES GREEN project was a success. The students were engaged throughout the project and enjoyed the workshops and planting days. One hundred and forty-four native trees and shrubs were planted to reduce air pollution, prevent stormwater runoff, improve water quality, increase the tree canopy, and improve the aesthetics of the site. Planting sites from the past three years have been cared for by IES Tree Stewards and Tree Ambassadors from the Wheat Ridge Summer Sun Camp.

IES encourages comments and questions. Please contact IES at solutions@i4es.org or visit our website at www.i4es.org.

3. Introduction and Overview

This Report: 2018 Greenbelt Restoration and Environmental Education Network (GREEN) Project

This report will detail the development and implementation of the 2018 Greenbelt Restoration and Environmental Education Network (GREEN) project. The Institute for Environmental Solutions (IES) designed and implemented this project in Wheat Ridge, Colorado to improve the environmental health of the Greenbelt, while providing hands-on science education and socialization opportunities for students with emotional disabilities from Kullerstrand Elementary School. Maintenance for planting sites was provided during the summer by children at the Wheat Ridge Recreation Summer Sun Camp and twice weekly visits by IES Tree Stewards after the summer months. The 2018 GREEN project marks the third and final year of the GREEN initiative.

This report documents the project's development, planning, implementation, outcomes, and suggestions for future projects. The project marks the sixth year of partnership between IES and Wheat Ridge Parks and Recreation Department, and the fourth year of partnership between IES and Kullerstrand Elementary School. This report and its appendices outline the ecological improvements of the Greenbelt, the education program with Kullerstrand Elementary students, and the Tree Ambassador summer maintenance program with the Wheat Ridge Recreation Sun Camp. The program was developed to improve a new trail section in the Greenbelt that was paved in fall of 2015 and was designed to use green infrastructure to decrease stormwater runoff and erosion, while increasing plant diversity and canopy coverage over a three-year period. WRPRD had to remove several large, mature trees during the paving process, and needed help to revegetate the areas around the trail. The project was also designed to provide valuable socialization skills for students with severe emotional disabilities, and hands-on naturalist training for Wheat Ridge children. This project and report will be a model for future environmental education programs, and volunteer planting and maintenance programs along Colorado's Front Range.

Institute for Environmental Solutions

IES delivers scientific solutions to improve health and the environment. IES's vision is to create efficient ways of dealing with complex environmental problems. IES strives to prevent waste and unwanted side effects, provide opportunities to optimize environmental improvements and reduce energy consumption and green gas emissions through a unique multi-disciplinary approach. By engaging a broad spectrum of participants in examining these problems on a project basis, IES will develop sound, cost-effective solutions.

The IES Tree Project

The IES Tree Project's mission is to improve the environmental quality of Colorado cities using tree science. The Tree Project helps communities, businesses, and individuals achieve multiple environmental improvement goals using one tool: city trees. Tree Project Graduate Interns and Institute Associates work on several initiatives to optimize the environmental, social, and economic benefits of urban trees. These initiatives include developing and implementing community tree-planting programs, climate change mitigation through urban forest carbon credits, presenting workshops describing the benefits of urban forestry, conducting research on tree science, and outreach to achieve greater understanding of urban forestry impacts.

The goals of the Tree Project are to:

- Improve the urban environment through strategic tree planting
- Facilitate collaboration among many community groups and individuals to find solutions to urban environmental challenges with trees
- Advance urban forestry science through increased collaboration with academic researchers and local experts

The IES Tree Project has completed nine planting programs. The first planting program, Trees for Healthy Kids and Community Project, happened during the fall of 2010 and spring of 2011 in Golden, Colorado. IES partnered with Mitchell Elementary School and the City of Golden to mitigate wind and noise and air pollution by planting 40 trees on school property.

IES then partnered with the City of Broomfield to implement the Trees for Healthy Community and Economy Project in 2011-2012. The project resulted in a plan and planting day designed to improve the local economy of Broomfield's new civic center using urban trees.

The Sheridan Quincy Project was initiated during the 2015 school year. The first program, the 2015 Sheridan Quincy Tree Project, saw the planting of 60 trees on Sheridan School District No. 2 property and the first year of interactive hands-on classroom workshops that combined science and leadership activities for the Fort Logan Northgate (FLN) 3-8 School Leadership class. Students planted all sixty trees in a spiral pattern developed by DesignWorkshop. Species included catalpa, big-tooth maple, and hackberry.

Student from FLN watering during a site visit, April 2016

During 2016-17, IES designed and implemented the second year of the Sheridan Quincy Project. After careful review of the planting easements along the trail, IES and DesignWorkshop continued the spiral design from the tree planting the previous fall to implement the first plantings along the trail. Low-rooting and native shrub species were selected to meet easement restrictions and boost survival rates along the trail. Students from FLN participated in multiple hands-on classroom workshops where they learned about Colorado's ecology and how to plan and implement community improvement projects. The students then planted three shrub bands along the trail including Wood's rose, mountain mahogany, and three-leaf sumac.

FLN students planting shrubs, Fall 2017

IES volunteers during the Growing the Greenbelt Planting, Spring 2015

As a result of these projects, the IES Tree Project has discovered that there are five critical factors that go into a successful environmental improvement project:

1. Collaboration with the full range of interested stakeholders
2. Careful planning of the educational and planting activities for the program
3. Careful selection of planting sites and plant species to optimize survival
4. Strong instruction and proper planting with a well-organized volunteer stewardship program
5. Appropriate maintenance of planting sites

History of IES Projects in Wheat Ridge

IES has implemented five successful planting programs in Wheat Ridge. During 2012-13. IES initiated its first partnership with the City of Wheat Ridge with its Revive the Greenbelt! program. During the program, more than 200 volunteers planted over 200 trees and removed invasive weed species along Clear Creek in the Wheat Ridge Greenbelt to help improve canopy cover and erosion in the riparian habitat.

In 2013-14, the first educational program was added to IES's planting programs. The Preserve the Greenbelt Elementary Education Program combined innovative hands-on workshops, education planting days, and volunteer tree stewardship to engage students, educators, and families from Kullerstrand Elementary, Mountain Phoenix Community, and Wheat Ridge High Schools. The program resulted in 120 students participating in workshops and planting days, where over 200 native tree and shrub species were planted in the Greenbelt. The Colorado Alliance for Environmental Education awarded the Preserve the Greenbelt project with its 2014 Environmental Education Award for Excellence.

In 2014-15, IES continued its work in the Greenbelt and its collaboration with the City of Wheat Ridge and Wheat Ridge High School with the Growing the Greenbelt Education and Environmental Health Project. Students from Wheat Ridge High's Career Exploration Class learned about Colorado's ecology and careers in science through hands-on classroom workshops and an interactive planting planning event where they worked to prepare materials for a community planting day. The project culminated with the planting of over 150 new trees, shrubs, and grasses completed by community volunteers.

Since 2016, IES has planned and implemented a three-year environmental improvement project along a new trail section in the Greenbelt. The Greenbelt Restoration and Environmental Education Network (GREEN) program has resulted in three years of hands-on science education for students from Kullerstrand Elementary School, six planting days in the Greenbelt with over 800 trees, shrubs, and grasses planted, and a watering program with local children from the Wheat Ridge Summer Sun Camp.

Sun Campers learning how to mulch, Summer 2017

Students from Kullerstrand Elementary at the 2014 Preserve the Greenbelt planting day

4. The GREEN Project

Background

The 2018 IES Greenbelt Restoration Environmental Education Network (GREEN) project is the final year of a three-year project to restore trees and native plants along a newly built trail in the City of Wheat Ridge Clear Creek Greenbelt Open Space. This innovative program focuses on providing elementary school students with serious emotional disabilities (SED) with a hands-on environmental education program in which they implement a needed planting project in the Wheat Ridge Greenbelt to address stormwater runoff, erosion, and non-native vegetation concerns. The program was developed after IES was contacted by Kullerstrand Elementary school psychologist Jane Reuteler about developing a planting program for the students involved in the Teaching Responsibility and Independence with Learning Supports (TRAILS) program. After consulting with the City of Wheat Ridge, the trail planting project was developed. The program also continues IES's and WRPRD's partnership to provide hands-on naturalist training and outdoor education opportunities for children through the Wheat Ridge Summer Sun Camp.

Construction of the trail in 2015 resulted in the loss of several large trees in the Greenbelt, as well as the establishment of several invasive weeds. Starting in 2015, IES worked with the Wheat Ridge Parks and Recreation Department (WRPRD) to develop a multi-year planting plan to restore native trees, shrubs, and grasses along the trail and provide TRAILS students at Kullerstrand Elementary with hands-on environmental education opportunities.

The 2018 IES GREEN Project is the sixth year of collaboration with the City of Wheat Ridge in the Greenbelt. Additional projects include the Revive the Greenbelt! (2013), Preserve the Greenbelt Elementary Education Program (2014), Growing the Greenbelt Education Ecological Health Program (2015), and the 2016 and 2017 GREEN projects. It is the fourth year of collaboration with Kullerstrand Elementary School.

The goals for the 2018 GREEN Project were:

1. Improve the ecological and environmental health of the Wheat Ridge Greenbelt to improve conditions and restore trees along a newly built trail.
2. Provide educational opportunities for students in the TRAILS program at Kullerstrand Elementary School and for local children participating in the Wheat Ridge Summer Sun Camp.
3. Bring the community together to restore native plants in a cherished open space.

To accomplish the goals for the 2018 GREEN Project, the following objectives were developed:

1. Forty students from Kullerstrand Elementary School will complete two classroom workshops with lessons on Colorado's ecology and environmental improvements for the Greenbelt, while providing an opportunity for TRAILS students to socialize and work with their general education peers and members of the community.

The first objective meets the second goal by developing an educational program that is aligned with curriculum standards for students in the TRAILS program.

2. Students and community members will plant over 120 native trees and shrubs along a new section of trail in the Wheat Ridge Greenbelt.
3. Thirty-five children from the Wheat Ridge Summer Sun Camp will care for the site and learn about the environment during the summer of 2018.

4. IES Tree Stewards will care for the site for two more years to ensure plant survival rates are over 70%.

The second, third, and fourth objectives meet goals 1 and 3 through the development of a planting project that improves the ecological health of the Wheat Ridge Greenbelt in a manner that engages many community members. Students, volunteers, and summer camp attendees will have the opportunity to learn about the Greenbelt and how they can contribute toward environmental improvement in their community.

5. IES will produce a project report and a project video to document and evaluate the project, which they will distribute to all project stakeholders and volunteers.

The final objective of the 2018 GREEN Project aims to further improve the methods and activities used for similar projects, by providing a thorough overview and evaluation of how well the project met its desired goals and improvements to make in the future.

2018 GREEN Project

The 2018 planting plan was based on the original GREEN planting plan developed by Andrew Rasmussen in 2015 as part of his final project for the Master of Urban and Regional Planning program at the University of Colorado, Denver. The original 2018 plan focused on filling in native vegetation in two areas on the western portion of the trail. It can be found in Appendix I. The first area was near an informal turnaround, west of the IES site planted in 2016. The second area was north of the creek by the Moore Street entrance to the Greenbelt. After discussions with WRPRD, there were concerns that the separation of these two sites would present logistical problems for the planting days. The areas are far apart, and the second site is around a bend and on the other side of the river. This raised concerns about where to set up equipment and materials, how to adequately supervise and work with the students, and parking for volunteers, parents, and the school bus.

Due to these concerns, the design plan was modified to increase the size of the area around the turnaround site. Additional plantings were also incorporated in a drainage area across from the existing oxbow and along the trail near the site planted by Mountain Phoenix School as part of the Preserve the Greenbelt project. Finally, to increase the number of plants to split between the two planting days, backplanting in the 2016 site was proposed to install a few larger trees and to fill in the site with additional shrubs along the trail. Final planting plans can be found in Appendix H. As a result, the final planting design included 154 plants in the new planting sites and an additional 18 plants in the 2016 GREEN planting site. Breakdowns of the species for each area are outlined in Table 1.

Table 1. Species planted in new planting areas for 2018 GREEN.

Species	Class	# Planted
Plains cottonwood	Large Tree	1
Peachleaf willow	Large Tree	7
American plum	Small Tree	6
Thinleaf alder	Small Tree	5
Golden currant	Shrub	23

Species	Class	# Planted
Wax currant	Shrub	19
Chokecherry	Shrub	15
Shrubby cinquefoil	Shrub	5
Red-osier dogwood	Shrub	9
Three-leaf sumac	Shrub	7
Lanceleaf coreopsis	Forb	19
Purple coneflower	Forb	18
Purple poppy mallow	Forb	14
TOTAL		154

Table 2. Species planted in the 2016 backplanting area for 2018 GREEN.

Species	Class	# Planted
Plains cottonwood	Large Tree	5
Peachleaf willow	Large Tree	3
Thinleaf alder	Small Tree	4
Red-osier dogwood	Shrub	4
TOTAL		18

Spring Workshops

As part of the environmental education component of the project, IES developed two workshops for the TRAILS students. For each workshop, students were divided into three groups and visited three separate module stations with information and activities related to the project. Each module engaged students in an activity for 15 minutes, with an introduction and closing segments to round out their time. The content for the modules was developed in collaboration with the TRAILS teachers to ensure that the topics covered were aligned with the school's curriculum standards for each of the classes. Different teaching and modeling methods were incorporated into the workshop modules to encourage students to make observations, ask questions, and learn in an interactive environment. Workshops were organized into two sessions, with students in grades 4-6 attending the first session and students in grades K-3 attending the second session. As an

opportunity to continue developing and practicing emotional and social skills, TRAILS students were given an opportunity to invite a general education peer to attend the workshops and planting days with them.

During the first workshop, students rotated between modules that taught them the proper techniques for planting trees and how to safely use the tools they would encounter during the planting days. They were also introduced to a nature journaling module, which would be used to tie the project events together. Students were taught how to use journals to document scientific observations throughout the project. The focus of the first workshop was to introduce the students to the project and provide them with some initial instruction on what they would be doing during the planting days.

Students learning how to plant a tree

The second workshop occurred after the planting days had taken place and served as a bookend to their time in the Greenbelt. Modules for the workshop included writing thank-you cards to the project sponsors and stakeholders, a mapping activity to document where different planting activities took place, and a final journaling activity to write down their final thoughts and observations from the project. Outlines and module materials for both workshops can be found in Appendices B and C.

Planting Days

IES managed two planting days hosted by the Wheat Ridge Parks and Recreation Department for the TRAILS students from Kullerstrand Elementary. Students were divided into two groups during the planting events, which rotated between two activities: planting and an interpretive activity about the Greenbelt.

The first planting day took place on April 13, 2018, with students planting the turnaround portion of the design plan. Susan Bennett from WRPRD and Kelly O'Toole led students on a nature walk to show them different factors around Clear Creek that affect water flow and erosion. Students were then given an opportunity to work in their nature journals by drawing or writing down any observations they had from the day.

The second planting day took place on April 30, 2018, which focused on backplanting in the 2016 site and planting near the 2014 Preserve the Greenbelt site. Students were also taught about noxious weeds and given the opportunity to weed along the eastern end of the trail. After weeding, students then talked about the importance of invasive species removal and native pollinators while working in their nature journals.

Maintenance

Regular maintenance for the site is provided by several project stakeholders who visit the site to provide plant care and ensure that issues and concerns are addressed in a timely manner. Regular maintenance for the planting sites is provided by the IES Tree Stewards. Tree Stewards are dedicated volunteers from the local community who provide much needed care to planted sites. Tree Stewards are assigned portions of the planted sites, which they water, weed, and mulch twice a week. Sites usually number between 50 and 120 plants.

In addition to the Tree Stewards, the Wheat Ridge Summer Sun Camp campers provide care to IES planting sites in the Greenbelt as part of the IES Tree Ambassador Program. Sun Campers, who range in age from 6 to 14 years in age, visit the site twice a week from June to August to water and weed plants in the 2017 IES planting site under the guidance of

IES Tree Project Associates and Tree Stewards. At the end of the summer, IES Associates thank the students for their hard work at the Tree Ambassador Ceremony.

WRPRD is an important partner in providing maintenance to the planted sites. As part of the project, WRPRD moved a water tank to the turnaround site to make it easier for Tree Stewards to water the site. WRPRD staff refilled water tanks along the trail twice a week, made regular visits to the site to note any issues or concerns that may arise, and provided additional supervision for the Sun Campers when needed. Susan Bennett met with the Sun Campers during the summer to teach them how to measure the plants and make observations about their growth and establishment.

Wheat Ridge Summer Sun Campers after caring for the Greenbelt

Project Donors

The 2018 GREEN Project was generously funded thanks to the financial support provided by a variety of donors. The Community First Foundation for Jefferson County provided a grant as part of the Improving Conditions of Community Health Program. Patagonia Denver, in its third year as an IES project funder, provided grant support as part of the Environmental Grants program. IES also received funding for the project from the City of Wheat Ridge through the Outside Agency Contribution Fund. Funding provided for the project was used to purchase educational materials for workshops, plants, and equipment for the planting days. The success of the 2018 GREEN Project was due to the support of these organizations for environmental education and urban tree planting projects that improve local community spaces.

5. Project Organization

The 2018 GREEN Project was an education and environmental improvement project in Wheat Ridge, Colorado. IES was responsible for planning, implementing, and managing the project. Project stakeholders provided time and materials for the project. GREEN occurred from January through August of 2018. A full list of the project responsibilities can be found in the Memorandum of Understanding (MOU) in Appendix G.

Project Stakeholder Involvement

The 2018 GREEN Project relied on the in-kind and material donations from our stakeholders in Wheat Ridge. The project was possible through the generous donations that these stakeholders contributed to the planning and implementation of the project. The following is a list of stakeholders and their contributions to this year's project.

Wheat Ridge Parks and Recreation Department

Wheat Ridge Parks and Recreation Department (WRPRD) is a project stakeholder that provided in-kind and material contributions to the project. Margaret Paget, Open Space and Trails Supervisor; Robin Rice, Forestry Technician; and Susan Bennett, Environmental Interpreter, provided valuable feedback during multiple planning meetings for both the environmental and education aspects of the projects. They reviewed all planting plans and education materials prior to planned workshops and planting days. WRPRD provided material donations including plants water, mulch, gloves, wheelbarrows, and weeding and digging tools for the planting days and maintenance programs. Susan Bennett provided education materials and participated in all classroom workshops and planting events with the TRAILS students by leading an interactive journaling activity. Ms. Bennett also led plant measurement workshops with the Wheat Ridge Recreation Summer Sun Camp Tree Ambassadors once a month during the summer maintenance program.

Kullerstrand Elementary School

Kullerstrand Elementary School was a project stakeholder and provided in-kind support to the project. Jane Reuteler, Kullerstrand Elementary School Psychologist, and TRAILS teachers Sarah Dahlberg and Jessica Neuman provided

Planting Day One

Classroom Workshop One

valuable reviews of all educational materials during multiple meetings with the IES Tree Project Team. Kullerstrand staff members provided supervision during all project events and transportation for TRAILS students to and from the Greenbelt for planting events.

Wheat Ridge Summer Sun Camp

The Wheat Ridge Summer Sun Camp was a project stakeholder. Sun Campers and camp counselors visited the planting site twice a week to weed and water. Once a month, campers completed naturalist activities including tree measurements with Susan Bennett of WRPRD. The sun camp provided water for kids and materials for the summer-ending Tree Ambassador Ceremony.

Planting Day Two

The Tree Project Steering Committee

IES drew from the expertise of the IES Tree Project Steering Committee members throughout the project. The Tree Project Steering Committee is a group of dedicated volunteers with backgrounds in multiple related professions that aids the Tree Project. IES Tree Project members took advantage of quarterly meetings with Steering Committee members to gain insight on ways to improve the project. A list of Steering Committee Members can be found in the Authors and Acknowledgements chapter of this report, and the meeting agendas from quarterly meetings can be found in Appendix D.

Collaborative Funding

GREEN was funded through grant support and in-kind and material donations from project stakeholders. Funders for the project included the Wheat Ridge Outside Agency Contribution Program, the Community First Foundation for Jefferson County, and Patagonia Denver. The success of the project depended on these financial contributions from funders and from the in-kind time and material donations listed above.

IES worked diligently to secure funding for the program. IES Tree Project team members wrote and submitted numerous grant applications, implemented community outreach, and sought individual donations to increase the scope and effectiveness of the project to meet project goals.

WRPRD staff employee Susan Bennett guiding Kullerstrand students during a journaling activity at planting day 2

Project Plan

IES Project Coordinator Patti Venneman developed a project plan that guided team members during the project. IES presented the plan to stakeholders and the Tree Project Steering Committee to receive guidance on how to improve project development and implementation. The project plan can be found in Appendix A.

The project timeline is shown in the project plan. Planning for 2018 GREEN began in the fall of 2017 with meetings between IES and WRPRD and Kullerstrand Elementary School. IES met with stakeholders initially to review the basic plan for the project, begin development of the education and planting events, and discuss funding for the project. IES then worked independently to plan project details before meeting again with stakeholders for final approval of the project materials. Finally, after implementing the workshops and planting days, IES met with stakeholders to evaluate the project prior to writing this report. Stakeholder meeting agendas with stakeholders can be found in Appendix E.

The plan included six major components:

- Develop project objectives and schedule events
- Plan and implement classroom workshops
- Plan and implement planting days
- Maintain the Tree Ambassador and Tree Stewards programs
- Engage in community outreach efforts
- Evaluate success of the project and write a Final Report

Planting Day Two

6. Project Organization and Community Collaboration

The success of the 2018 GREEN Project was largely due to IES's collaborative work supported by a wide range of community members and organizations in the City of Wheat Ridge. IES works with a variety of project stakeholders in the Wheat Ridge community who provide valuable knowledge, experience, time, and material resources for project activities. Their input assists IES in scheduling project events, developing planting design plans and workshop curriculum, and managing activities, volunteers, and students throughout the project. The resources and input provided by stakeholders assist IES in developing and implementing each project.

Partnership between IES and WRPRD

The 2018 GREEN Project marks the sixth year of a valuable partnership between IES and the Wheat Ridge Parks and Recreation Department (WRPRD). The Wheat Ridge Greenbelt, the project site, is owned by the City of Wheat Ridge and managed by WRPRD. WRPRD staff members' knowledge about the site, such as environmental conditions, water availability, and plant diversity at the planting sites, is vital in developing a realistic and effective planting plan for the project. Scheduling of project events is also done in collaboration with WRPRD, as its staff members assist with workshops, help the Tree Stewards, and support IES Associates during planting days. For the 2018 GREEN Project, WRPRD provided additional in-kind and material support for the project by purchasing plants for the project. The dedication and support of WRPRD's staff is due to the generous time and effort provided by Margaret Paget, Robin Rice, Susan Bennett, and the entire Forestry and Open Space staff, who have worked with IES during several projects.

Wheat Ridge Parks and Recreation Staff assisting with tree placement during the first planting day

IES works with the WRPRD staff through the Wheat Ridge Summer Sun Camp Program. Students in the summer camp program visit the site twice a week to water, weed, and mulch plants in the Greenbelt under the supervision of IES Tree Project Associates and Tree Stewards. Beth June, Recreation Coordinator for the City of Wheat Ridge, coordinates the Sun Camp campers' site visits with IES. The Sun Camp staff works with IES to ensure that all the trees in the designated area are watered properly and to address potential behavioral issues that may occur. The support provided by the Sun Campers contributes to the overall survival of plants in the Greenbelt.

Partnership between IES and the Kullerstrand Elementary TRAILS Program

IES team members and Kullerstrand Elementary School staff members have worked together for five years in the Wheat Ridge community. Their continued collaboration with IES introduces a new generation of students to environmental improvement through hands-on learning and practical planting projects. The GREEN project specifically works with students with serious emotional disabilities who are part of the Teaching Responsibility and Independence with Learning Supports (TRAILS) program. The students are important volunteers who learn to properly plant trees while exploring Colorado's ecology and their local parks. The 2018 GREEN Project is a continuation of a multi-tiered educational program designed to give Kullerstrand TRAILS students opportunities to learn and work with their general education peers. Development of the educational program and outdoor activities is done in close collaboration with the TRAILS teachers, led by Jane Reuteler, the school's psychologist. IES meets with school staff members to develop the project schedule, plan for workshop modules

and planting day activities, and address logistics for getting students to different project events. TRAILS teachers review workshop curriculum and interpretive program outlines. Input and assistance from the staff at Kullerstrand Elementary are essential for developing a well-rounded educational program that not only teaches the students about the importance of environmental stewardship but also reinforces lessons they are currently learning in the classroom.

The IES Tree Project Steering Committee

The IES Tree Project meets with its Steering Committee on a quarterly basis. The Tree Project Steering Committee is made of several dedicated local professionals with backgrounds in science, education, and forestry who volunteer their time to help the IES Tree Project develop projects. Their expertise is valuable in addressing issues, concerns, or questions IES Associates may encounter during a project.

Thank you card for the Community First Foundation created by TRAILS students at Kullerstrand Elementary School.

IES Tree Stewards

To maintain the new planting sites, IES uses a group of dedicated local volunteers known as the Tree Stewards. The Tree Stewards are recruited from the local community and are trained in how to properly water, weed, and mulch the newly planted sites along the Greenbelt. To break up the work at each site, Tree Stewards are assigned a specific set of plants to care for twice a week. Stewards also assist IES Associates by providing additional support during planting days and supervising the Wheat Ridge Summer Sun Campers during the summer.

Importance of Community Collaboration

The success of the 2018 GREEN Project depends on the ability of IES to create and sustain successful partnerships with project stakeholders and collaborators. Ongoing collaboration with WRPRD and Kullerstrand Elementary has fostered continued support for the IES Tree Project's mission to improve local communities through tree planting. IES's partnerships have also increased awareness for the various projects in the community, providing additional opportunities to recruit and meet potential volunteers and gain additional support for projects. The collaboration with Kullerstrand Elementary and the Wheat Ridge Sun Camp has introduced a new generation of students to environmental stewardship by demonstrating and teaching students how to make practical and realistic improvements in their communities and their environment. Whether students are planting trees or providing regular maintenance along the trail, the children are becoming connected to their community's open space and contributing to the long-term success of such natural areas.

Wheat Ridge Summer Sun Campers work with WRPRD volunteers to measure trees in the Greenbelt

Project Video

Local videographer Jesse Johnson of IOTK Media was hired to document all project events and create a project video. Mr. Johnson attended classroom workshops, planting days, and one of the watering days with the Sun Campers. He conducted interviews with students, IES Associates, project stakeholders, and volunteers to capture the importance and relevance of the project. The video was reviewed by the IES Tree Project Team, Margaret Paget, and Jane Reuteler. Mr. Johnson then created a short promotional video to introduce the project and a longer video to cover all project activities. When completed, the project video will be distributed to all project stakeholders and posted to the IES website and YouTube Channel.

Project Communications

To create additional awareness and interest in the project, IES developed a variety of media communications to inform the local community and IES supporters of the project. IES Associates wrote articles about the project to include in the IES quarterly newsletter. These articles announced different project events, provided recaps of workshops and planting days, and recruited Tree Stewards to help care for planting sites. IES developed a project prospectus to introduce the project to the community and other IES stakeholders.

Social media posts were developed for Facebook, Twitter, Instagram, and LinkedIn. As a Patagonia grantee, IES was able to connect with other like-minded individuals as part of the Patagonia Action Works network. By posting information about volunteer events or needs, IES can connect with individuals who may choose to donate, volunteer, or support projects.

GREEN Project Logo

7. Project Design and Events

Project Planning

Project planning began in the summer of 2017 with a project plan and budget (see Appendix A) drafted and managed by Patti Venneman. The planting plan was based on the original three-year plan developed by Andrew Rasmussen, University of Colorado, Denver Masters of Urban and Regional Planning student. Adjustments to the plan were designed in collaboration with the Wheat Ridge Parks and Recreation Department (WRPRD) and IES Associate Sabrina Kleinman. Plantings filled in areas near the trail on the eastern end of the trail between the Kipling and Moore Street entrances and back planting in the 2016 GREEN and 2014 Preserve the Greenbelt sites. See Appendix I for the original plan and Appendix H for the updated plan.

Greenbelt Trailhead

Stakeholder Meetings

IES held preliminary meetings with WRPRD and Kullerstrand Elementary School to discuss the plans for the spring workshop curriculum, the planting plan, and dates for the workshops and planting. IES held a series of meetings at the Greenbelt with WRPRD to discuss the planting plan and logistics for planting days. These were held on September 15, 2017, November 14, 2017, and January 15, 2018. Meetings with Kullerstrand Elementary School to plan dates and workshop modules were held on October 2, 2017, and January 12, 2018. Agendas for these meetings can be found in Appendix E.

Workshop One Design

The first workshop was organized by IES Intern Kelly O'Toole. It was broken down into three educational standards-based modules. The modules were: how to plant, tools and safety, and an introduction to nature journaling led by Susan Bennett of WRPRD. The workshop one outline and modular content can be found in Appendix B, and a photo of the nature journal can be found in Appendix J.

Workshop One Event

The first workshop was held on March 19, 2018 at Kullerstrand Elementary School in one of the TRAILS classrooms. IES held two workshop sessions; one for kindergarten through second grade, and the second for third through sixth grade. Students were introduced to the project, IES team members, and Susan Bennett. Students were then broken up into three groups, which rotated through the modules. Kelly O'Toole led the "How to Plant" module where the students were taught the basics of planting shrubs. She went over the parts of a plant, and then showed the students how to plant shrubs while allowing students to participate in steps along the way. Patti Venneman led the "Tools and Safety" module. She handed various tools to the students, went over how to safely handle the tools, and then students looked at photos of tools and people in various outfits, before discussing what was correct and incorrect in the photos. The photos can be found in Appendix K. Susan Bennett led the nature journaling module. She gave each of the students a handmade journal, had them write their names on it, and then showed them different items found in nature. The students were then instructed to journal about the items. At the end of the workshop, students were allowed to vote on the color of the t-shirts they would be wearing for both of the upcoming planting days. Workshop one photos can be found in Appendix L.

Workshop Two Design

Workshop Two was also created by Kelly O'Toole and designed to meet local education-based standards. The workshop was divided into three modules: thank you notes, mapping, and nature journaling. The outline and modules for the second workshop can be found in Appendix C.

Student learning how to properly hold tools

Workshop Two Event

The second workshop was held on May 14 in the Kullerstrand Elementary School gym. It was divided into two groups; kindergarten through second grade, and third through sixth grade. IES began with an introduction to the workshop and then students divided into three groups and rotated through the modules. Students participated in all three modules. Sabrina Kleinman led the mapping module where students were shown a map and were asked to identify key locations along the Greenbelt and around the planting area. They also learned cardinal directions and map orientation. Kelly O'Toole led the "Thank You" module. Large pieces of paper with the names of GREEN funders and WRPRD were on the table. Students drew pictures with their names on the paper. Thank you notes were sent to funders and WRPRD with a project update. The nature journaling module was led by Susan Bennett. Students learned about willow stakes and journaled their final thoughts about what they learned and what they saw in the Greenbelt. Students took their journals home at the end of the workshop. The workshop closed and IES team members thanked the students for their hard work. Photos from Workshop Two can be found in Appendix M.

Planting Day Design

The planting design was a collaboration between IES and WRPRD. Sabrina Kleinman developed and finalized the design based on the previous three-year plan developed by Andrew Rasmussen. IES worked with Colorado State Forest Service Nursery to purchase the plants and have them delivered to WRPRD storage. The students planted 144 plants and shrubs. Please see Appendix H for the planting plan.

2018 GREEN Site

1 plains cottonwood
4 peachleaf willow
6 American plum
3 thinleaf alder
23 golden currant
19 wax currant
9 red-osier dogwood
7 three-leaf sumac
20 western snowberry
19 lanceleaf coreopsis
18 purple coneflower
14 purple poppy mallow

2016 GREEN Backplanting

Students also back-planted in the 2016 GREEN site, where twenty trees and shrubs were planted.

4 peachleaf willow
4 plains cottonwood
6 red-osier dogwood
6 thinleaf alder

Planting Day One

The first planting day took place on April 13. The forecast was cold and snowy. IES made contingency plans in the event that it would be too cold or that there would be too much snow on the ground. The make-up date was scheduled for May 4. It snowed the morning of the event. However, the event was held at the request of WRPRD and Kullerstrand Elementary. The students arrived by bus 15 minutes late because the bus got lost. IES introduced the students to WRPRD staff and IES Tree Stewards. They were divided into two groups: the planting group and the nature journaling group. Sabrina Kleinman, with the assistance of WRPRD employees and IES Tree Stewards, led the planting group. The students were given a ten-minute break before transitioning to either journaling or planting, but many students were very eager to plant and planted during their break. The nature journaling group was led by Susan Bennett and Kelly O'Toole. Students learned about stream and human caused erosion and how each were caused. They learned how pole planting of willow stakes reduces stream erosion. Students were then given their nature journals, crayons, tree cross sections, and plastic animal track molds to do rubbings and write about what they had learned. At the end of the planting day, IES took a group photo and the students returned to school. IES Associates, WRPRD, and IES Tree Stewards finished up the planting that was left over after the students returned to school. Photos can be found in Appendix N.

Kullerstrand students during Planting Day One

Kullerstrand students learning about weeds

Planting Day Two

The second planting day took place on April 30. It was the Monday after a long weekend and an unforeseen school closure, so many of the students were not dressed properly for planting. The students arrived by bus, which got lost again, causing students to be late to the event. Once on site, the students were divided into two groups. The planting team was led by Sabrina Kleinman, WRPRD, and IES Tree Stewards. The students back-planted the 2016 GREEN site and added new plants to the trail next to the 2014 Preserve the Greenbelt site. They finished planting at the 2018 site on the west end of the trail. The second group weeded and worked in their nature journals. John Kelly led a group of students to the 2016 site where they weeded. The students then met with Susan Bennett and Kelly O'Toole to journal about the importance of invasive species removal and protecting native pollinators. A group photo was taken at the end of the event. Photos can be found in Appendix O.

Wheat Ridge Sun Camp Tree Ambassador Program

The Wheat Ridge Sun Camp Tree Ambassador Program took place from early June to mid-August. Wheat Ridge Parks and Recreation Sun Campers walk to the Greenbelt on Tuesday and Friday mornings to water and weed the 2017 GREEN site. These watering events are led by IES team members, Betty Jo Page, and other IES Tree Stewards. Once a month, Susan Bennett worked with the kids to measure the trees on the 2016, 2017, and 2018 planting sites. The program culminated

with a Tree Ambassador ceremony in which the campers received recognition for their work on the trail along with certificates. Watering schedule and pictures are found in Appendices P and Q.

Summer Watering and Maintenance Schedule

The summer watering is done by IES Tree Stewards. They are assigned locations to water plants, weed, and mulch. The Tree Stewards set their own schedules, but IES asks them to visit the Greenbelt twice a week during the hottest parts of the year. IES provides watering buckets and WRPRD provides the water in the watering tanks.

Summer Sun Camper measuring a tree

8. Project Evaluation

The third and final year of the Wheat Ridge GREEN project was a success. IES met all project objectives, in some cases surpassing the original goal. IES continues to work with GREEN stakeholders to discuss plans for continuing collaborative environmental education and restoration projects in the Greenbelt.

2018 GREEN Objectives and Accomplishments

The 2018 GREEN project accomplished the following objectives:

1. Forty students from Kullerstrand Elementary School will complete two science classroom workshops with science lessons about Colorado's ecology and how to improve the Greenbelt, with the opportunity to socialize with their peers and community.

IES continued the modular educational model implemented in GREEN workshops starting in 2017. Teachers and students responded positively to smaller student groups to allow for more hands-on opportunities for students. IES team members could easily reuse modules, such as the safety and tools and tree-planting modules from previous years while making small adjustments when needed. IES team members made a strong effort to incorporate grade-appropriate Colorado Department of Education science academic standards where applicable.

Associate Sabrina Kleinman leads students through an interactive mapping activity at the second workshop

A new nature journaling module was added to all workshops and planting days, with each one building on the previous event as the project events unfolded. Susan Bennett, Wheat Ridge Parks and Recreation Environmental Interpreter, provided handmade nature journals and guided students through interactive journaling activities around topics such as native pollinators, natural and human caused erosion, and environmental stewardship. Journaling gave students an opportunity to express thoughts and ideas in a creative, unstructured way that engaged students of all reading and writing levels. Kullerstrand stakeholders thought the activity successfully engaged students during each event and allowed students to build relationships with Susan Bennett and their peers.

A new mapping module was implemented during the second workshop, in which students identified key landmarks and cardinal directions on a map. The map incorporated the planting sites and other areas of the Greenbelt, which students used as reference points. Students worked together in groups to help each other correctly identify the location of important landmarks from memory. IES team members received positive feedback from TRAILS teachers, since the module used spatial skills built upon in their classroom curriculum and encouraged teamwork and communication.

2. Students and community members will plant over 120 native trees and shrubs along a new trail section in the Wheat Ridge Greenbelt.

Students planted 128 native trees and shrubs, surpassing the original objective. Many older students liked planting larger cottonwood trees. IES Tree Stewards and WRPRD staff planted 37 extra trees and shrubs, bringing the total to 165 trees and shrubs planted over two planting days.

Despite cold, snowy weather on the first planting day and hot, sunny weather on the second planting day, students were excited and engaged throughout the rotations during both planting days. Students worked together with IES team members and volunteers to plant, water, and mulch large trees and several shrubs and flowers.

3. Thirty-five children from the Wheat Ridge Summer Sun Camp will care for the site and learn about their environment during summer 2018.

Wheat Ridge Summer Sun Campers visited the Greenbelt twice a week, weather permitting, to weed and water the 2017 GREEN planting site as part of the IES Tree Ambassadors program. Each site visit included from 20 to 35 children and their counselors and IES volunteers. Along with developing basic horticultural skills, campers learned about invasive weeds and other aspects of Colorado ecology from their hands-on experiences in the Greenbelt. Under the guidance of Susan Bennett from WRPRD, Sun Campers developed practical science skills by measuring the growth of trees three times during the summer.

4. IES Tree Stewards will care for the site for three more years to ensure plant survival rates are over 70%.

2018 GREEN site maintenance is in progress. Most new plants have continued to grow and successfully establish themselves in the Greenbelt with the help of IES Tree Stewards. Tree Stewards will continue to monitor and care for the site year-round through the fall of 2020.

5. IES will produce a project report and a project video to document and evaluate the project, which they will distribute to all project stakeholders and volunteers.

IES hired a videographer, Jesse Johnson of IOTK Media, to capture the workshops and planting days on video. The videographer will edit and put together two videos, one short and one extended version, to share with the community and stakeholders. The report and videos will be available online through the IES website and the IES YouTube channel.

IES met with project stakeholders to receive feedback on GREEN's development and implementation. Meeting with Jane Reuteler, Sarah Dahlberg, and Jessica Neuman from Kullerstrand Elementary School, and Margaret Paget and Susan Bennett from WRPRD provided valuable information for this report.

Program Challenges and Recommendations

Workshops

Many students have participated in GREEN workshops and planting events over the past few years. While having students in the program for multiple years allows for more meaningful socialization opportunities and stronger connections to the Greenbelt, it also creates the potential issue of curriculum overlap. Maintaining a fresh, interactive curriculum for workshops and planting days while revisiting modules on important topics such as safety and how to plant will continue to be a challenge.

Recommendations

- IES team members can encourage more peer-to-peer teaching, with students who have previously participated in GREEN events teaching newer students. This type of activity can help strengthen social and leadership skills and provide more opportunities for socialization.
- Having mixed-age groups during the 2018 planting days worked well, and IES team members can consider continuing this organization for future events. Older students were able to assist with more complex planting activities, such as planting larger trees and shrubs. Younger students were able to learn about planting from

their older peers and ask questions while in the field.

- IES team members should work with Kullerstrand teachers and staff members ahead of the new school year to help implement topics that students are already reviewing in their regular classroom curriculum. Incorporating familiar themes into IES workshop and planting day curricula can help with student understanding and real-world application of learning to the Greenbelt.
- IES should review and discuss ideas for new classroom modules prior to meeting with educators at Kullerstrand Elementary.
- IES team members and stakeholders can explore new partnerships with other organizations around the Greenbelt to incorporate more opportunities to learn about Colorado ecology and the Greenbelt.

Planting days

Some students were not dressed properly for the weather or physical labor involved during the planting days. This was especially true for the second planting day, when students had just returned after a long weekend. Students had to be reminded about safety regarding tools during the planting day, especially concerning sharp, heavy tools.

Recommendations

- Planting days should take place later in the week rather than on Mondays, and preferably on Friday, allowing teachers and staff to remind students the day before about proper attire.
- Students should have worksheets to take home to their parents a few days prior to planting events that review important safety measures and appropriate attire. IES team members should have a brief reminder at the start of each planting day about tool safety, communication, and organization based on activities planned that day.

During planting days, there was often confusion among students about where to get water and mulch even though stations were set up. There were miscommunications between students and Tree Stewards regarding pre-digging holes and working together to tackle digging in rocky, compacted soil. However, the Kullerstrand staff overall felt that the interaction between IES volunteers and students was the best during the 2017-18 programs compared to previous events during the three-year GREEN partnership.

Recommendations

- There should be an adult volunteer from IES or a staff member from WRPRD assigned to each station to make sure students are going to the correct place to get mulch and water. Clear signs can be placed to help guide students, especially students who are new to working in the Greenbelt.
- When briefing Tree Stewards and other IES volunteers on working with Kullerstrand TRAILS students, there should be a focus on clear communication with students, especially when plans may deviate from how students may have been instructed in previous workshops. Volunteers should continue to be reminded at the beginning of each planting event that any disciplinary matters need to be handled by Kullerstrand staff.

Tree Ambassadors

Tree Ambassadors often have a difficult time completing watering and weeding in the heat. Some students try to avoid participation by sitting out or becoming preoccupied with picking out thistles from clothing. Tree Ambassadors are not

invested in the project at the beginning of the summer, making the first few visits difficult as Wheat Ridge Summer Sun Campers adjust to working in the Greenbelt.

Recommendations

- IES team members and volunteers can have additional tasks planned ahead of time that Sun Campers can participate in and rotate through during their site visits. For example, there could be students designated as lead water jug fillers, with different students filling this role during each site visit.
- Students can be rewarded with special snacks or prizes for good work, including IES stickers or ice pops.
- In future programs, IES team members can arrange an introductory workshop with Tree Ambassadors prior to their first site visit. The workshop should be similar to current IES classroom workshops, with rotating modules and engaging activities that explain local ecology, safety when working with tools, and the importance of environmental stewardship in the Greenbelt.

Plans for Printing, Binding, and Distributing this Report

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