

Kansas State University Stormwater Management Project – Manhattan, Kansas

Integrating Education, Research, and Practice

KSU WaterLINK: Connecting Students, Faculty, Staff, Professional Planners/Designers/Engineers, and Community Watersheds
 The goal of the WaterLINK project is to engage Kansas colleges and universities with local communities as partners in water-quality restoration and protection through service-learning, with the ultimate goal of improving water quality in high-priority watersheds. Faculty from Kansas colleges and universities receive WaterLINK mini-grant funding to assist with facilitating service-learning projects. Funding for WaterLINK and the KSU Stormwater Management Design/Build Project is provided by KDHE & USEPA funds as well as in-kind contributions from KSU and its community partners.

As part of the effort to evaluate WaterLINK mini-grant service-learning projects the Office of Educational Innovation and Evaluation (OEIE) conducted site visits and collected data from students, faculty, and community partners. KSU students completed pre- and post-participation surveys via a web link to the Kansas State University (K-State) Online Survey System. Community partners also completed surveys and faculty were interviewed.

Project Team:
 Professor Lee R. Skabelund, Assistant Professor, K-State Department of Landscape Architecture / Regional and Community Planning; Recipient of WaterLINK mini-grant funding for service-learning efforts during the Fall 2006, Spring 2007, and Fall 2007 semesters.

Cary Thomson, Graduate Student, K-State Dept. of Landscape Architecture / Regional and Community Planning (MLA 2007; lead designer)
 Dennis Day (LAR), Stacy Hutchinson (BAE), Rhonda Janke (HORT), and Tim Keane (LAR) served as primary faculty advisors.
 Tor Janson (MLA candidate) provided detailed critiques of the planting palette; Lorn Clement & Chip Winslow provided design critiques.
 Dan Donelin, Katie Kingery Page, Joe Myers, and ~60 students from at least five different disciplines assisted at the construction site.

Support and materials provided by: KSU Facilities & Grounds, Bayer Stone, Higgins Stone, Coonrod Construction, Midwest Concrete Materials, Atwood Rentals, Blueville Nursery, The Civitas Group, Kaw River Restoration Nurseries, CritSite Prairie & Wetland Nursery, and Three Rivers Engraving.



This collaborative planning/design charrette and design-build project has engaged students, faculty, staff, and professionals in the task of considering ecologically sound ways to treat stormwater that falls on the Kansas State University (KSU) campus.

In the process of envisioning the future and implementing a rain-garden, two specific goals have been achieved:

- 1) A rain-garden was designed and implemented, thus reducing stormwater run-off and improving water quality along a section of Campus Creek. The rain-garden was constructed during the Spring 2007 semester by KSU students, staff, and faculty -- with assistance from community partners -- at the International Student Center (ISC). Refer to images at the bottom of this poster.
- 2) Specific ways to effectively address urban stormwater runoff are being visibly demonstrated to KSU staff, students, faculty, administrators, and visitors. Additionally, ongoing maintenance, monitoring, and documentation of results offer insights for future rain-garden designs.



Open-ended Responses on Student Post-participation Survey Fall 2006 Stormwater Management Planning/Design Charrette

QUESTION - Please describe the Charrette activities you participated in.

SELECTED RESPONSES:
 "This charrette was linked to a senior project that was chosen by me and a couple other Biological and Agricultural Engineers. We were able to take this charrette event that was hosted by another discipline [LAR] and [then] go more in depth... for our semester long project."

"I enjoyed interacting with the professors and professionals. It was a enjoyable time working as part of team and not [being] looked at as though I was a student."

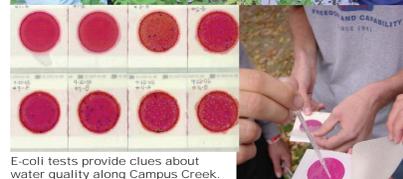
"My group was involved in looking at the existing conditions of the Campus Creek channel conditions, its alignment, and possibilities for improvement. We focused our design solutions upstream near the higher end of the watershed on campus. Our solutions focused on slowing down flow velocity and creating areas to promote infiltration to cut down on...erosion and flooding during...heavy rain."

"We designed a series of [Stormwater] Best Management Practices to increase the water quality of Campus Creek on the KSU campus. My small group focused on runoff from the large parking lots north of Claflin Road. I learned a lot from the professionals that worked with us on how to design terraces, bioswales, and rain-gardens to help slow, absorb and clean the water."

"The experience of the stormwater management charrette was extremely beneficial in many areas of my studies. I have begun to understand stormwater management and have implemented it into designs since the charrette. I will continue to support and implement stormwater management in my designs."



LAR 420 (Natural Systems & Site Analysis) students participate in a pre-charrette field visit to Campus Creek where they learned protocols for completing rapid water quality monitoring sampling. The results of Fall 2006 sampling along Campus Creek alerted KSU to high fecal-coliform (E. coli) counts, leading to additional studies by other K-State students in Spring 2007.



E-coli tests provide clues about water quality along Campus Creek.



LAR 420 students look for macroinvertebrates along Campus Creek on Oct. 25, 2006 as a way to better understand water quality indicators.



Apr. 1, 2008 Infiltration & Soil Testing.



May 10, 2008



May 7, 2007



May 16, 2007

More than 7 inches of rain fell in early May 2007, providing the opportunity to verify drainage patterns and runoff intensities during the final stage of the ISC rain-garden construction process. Below are images of rain-garden plantings, which went in on April 28th and May 5th. Additional plants were purchased from Bluebird and Blueville nurseries during the summer of 2008.



QUESTION - Would you assess the Charrette experience as a success? What factors contributed and what obstacles did you encounter that affected the project?

SELECTED RESPONSES:
 "This project was a huge success. I really felt that the facilities department of KSU will take into consideration the recommendations we made. It also gave students an opportunity to experience a common professional practice (charrettes) they otherwise would not have to opportunity to in the college. It gave a real world perspective to what all of these classes we are taking are all about."

"This was a successful project. I learned quite a bit from the experience as well as the lectures that took place one day prior to the charrette. The campus will also benefit from the experience as more developments will lessen the pollution and erosion of Campus Creek."

"The experience was an amazing success. The pre lectures given by experts in the field of BMP design and the inclusion of students ranging from 2nd to 5th year provided everyone with invaluable knowledge on stormwater management that they would not receive here otherwise."

"Yes it was a huge success. I have seen students incorporating ideas from the charrette into designs. I believe that it will continue to influence students designs and make them better professionals. I hope that there will be another opportunity for something like this again."

"This was a successful project. I learned quite a bit from the experience as well as the lectures that took place one day prior to the charrette. The campus will also benefit from the experience as more developments will lessen the pollution and erosion of Campus Creek."

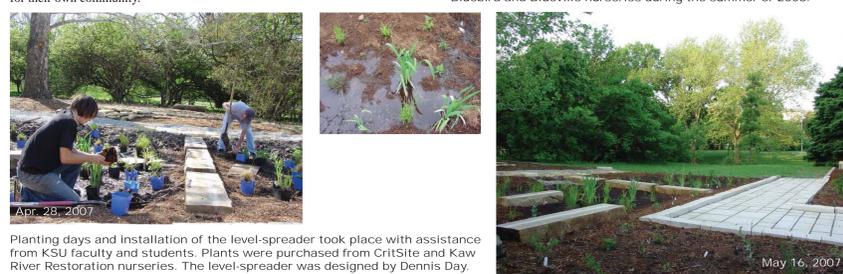
"This experience has allowed all of us to be more engaged in our designs from an ecological standpoint. It will help us out in our future designs as well..."

QUESTION - What recommendations would you make to other colleges about offering service-learning as part of their curriculum?

- SELECTED RESPONSES:**
- Make sure the students involved have adequate experience to participate, and inform the students of what exactly the project will entail. [Secure] more involvement in the preparation and follow-through from students.
 - Be prepared and get students involved during the early stages of development.
 - Have a well thought out plan for the event and include outside agencies and invited guests in the development of the event. Learn from those who have been a part of successful events before.
 - Good organization is extremely important. It is also vital that the goals of the program be communicated to participants beforehand.
 - Teach about the service learning before doing it.

- These projects are amazingly effective at teaching their intended subject and they should include students from all levels.
- I would highly recommend they do it. It really helps [hands-on] learners. I need to get my hands dirty to really understand something.
- [This project] helps...connect what [we] learn in class to a real problem. It was an excellent opportunity to work with professionals.
- Integrate [these types of activities] into course work more so that it becomes common for the students to expect to integrate service into their work.
- I would recommend them to offer this in their curriculum because I had very little knowledge about this subject before the activity and now after I have a much more knowledge about it. It really helped me to learn and retain the information when I can see physically how it will be used and benefit the areas.
- Each student should do it once. Hopefully we'll get to work on the build part of the design-build project, but the charrette was definitely a good experience.
- It is a great way for students to take what they are learning in the classroom and apply it to an actual site. Students learn at a greater rate and understanding when they have been able to have hands-on experience.

- Bring in professionals [from] a few disciplines. Multi-discipline teams can make for more realistic team experiences! Engineering and LAR!
- Colleges should note that this type of learning is beneficial beyond what is taught through a classroom setting. The experience is much more realistic and provides a challenge for participants. For students who are feeling frustrated by the lack of connection between their work and the real world, this can provide a meaningful practical experience. This type of project saves the university in not having to hire a professional to generate a plan and install in the students a sense of ownership for their own community.



Apr. 28, 2007



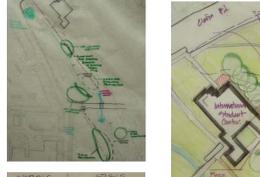
Two KSU sites were selected for focused stormwater management planning/design work during a one-day Charrette held in late October 2006. The first site focused on one of the largest parking lots on campus, while the second focused on the landscape surrounding the Derby Dining Complex and Residential Housing area.



Pre-Charrette lecture by Andrea Kevrick, Insite Design, Ann Arbor, Michigan



Dec. 18, 2006



Mar. 6, 2007



Mar. 19, 2007

As highlighted in this charrette drawing, deep-rooted prairie species allow for stormwater infiltration into even the heaviest of clay soils. Heavy clay soils predominate in much of Manhattan, including at the ISC rain-garden site.



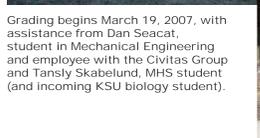
Mar. 20, 2007



Mar. 21, 2007



Mar. 23, 2007



Mar. 23, 2007

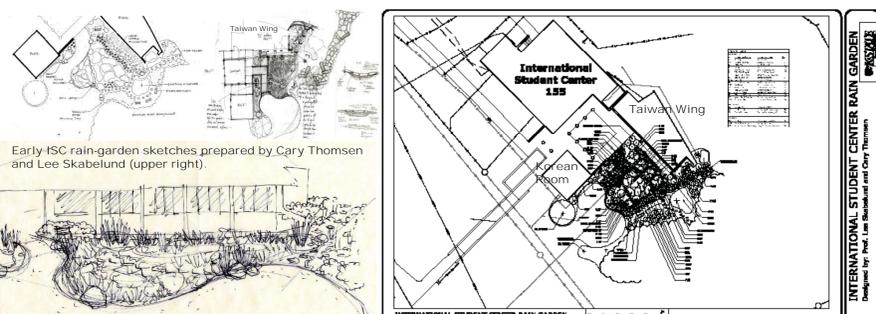
Grading begins March 19, 2007, with assistance from Dan Seacat, student in Mechanical Engineering and employees with the Civitas Group and Tansly Skabelund, MHS student (and incoming KSU biology student).

This service-learning project addressed stormwater-related problems in the lower Campus Creek area of the KSU campus. Landscape Architecture and Bio-Ag. Engineering students were grouped with landscape architecture professionals and faculty into teams of 10-12 people to design best management practices (BMPs) for two previously-identified problem areas on campus.

On October 26, 2006 guest lecturers, Andrea Kevrick (LA) and Tom Price (PE), spoke on stormwater management and sustainable site planning. Kevrick highlighted ways to work with clients to implement environmentally responsible stormwater management plans. Price discussed innovative, affordable, and ecologically responsible solutions for stormwater management in urban areas. That evening, Dennis Haag (Ecologist) offered examples of homnative plants and regionally-adapted ecosystems can be used in stormwater management.

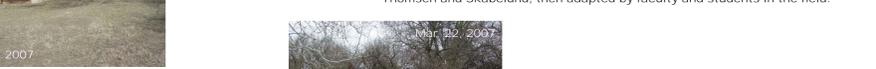
During the October 27th Stormwater Management Planning/Design Charrette, teams were presented with two goals: 1) design a rain-garden, stormwater management BMPs, and/or streambank improvements along a target area of Campus Creek, to improve the environmental setting and reduce stormwater runoff, and 2) demonstrate specific ways to address urban stormwater runoff to KSU administrators, staff, faculty, students, and visitors. Teams 1-2 were assigned to the large parking lot area behind the Wind Erosion Lab, Team 3 investigated the Campus Creek corridor, and Teams 4-10 explored the area near the International Student Center, Derby Dining Complex, and adjacent residential halls. Team members worked on-site and in Seaton Hall, developing conceptual designs for their assigned focus area, then presenting their work at an open house. Team members explained their ideas for stormwater management and stream improvements and answered questions posed by guests and other team members.

Most teams included designs and sketches for rain-gardens, bio-swales, porous pavement in parking lots, water retention ponds, vegetated detention areas, and green roofs. Many of these conceptual design ideas will be utilized by KSU faculty and staff in the coming years to develop feasible and affordable solutions for stormwater management within the Campus Creek Watershed.



Early ISC rain-garden sketches prepared by Cary Thomsen and Lee Skabelund (upper right)

During the Charrette it became apparent that there was both the interest in and need for a rain-garden or other similar stormwater management retrofit at KSU's International Student Center. Working with graduate student Cary Thomsen, Professor Skabelund met with ISC Staff and they then developed concept plans for a rain-garden. Above is the final planting plan prepared by Thomsen and Skabelund, then adopted by faculty and students in the field.



Mar. 23, 2007

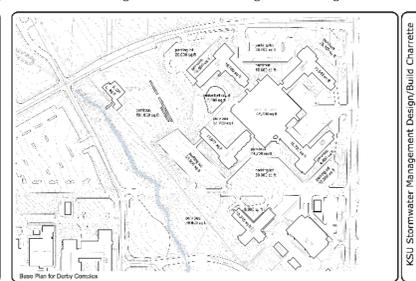


Mar. 23, 2007 12:14am



Mar. 23, 2007

ISC rain-garden construction was completed over a period of about two months (March 19 to May 16, 2007). Volunteer labor was provided by approximately 30 students from at least five different disciplines at KSU (including LAR 322, "Environmental Issues & Ethics" and LAR 439/764, "Landscape Construction" students).
 Work included: grading two shallow basins (approximately 8-12 inches deep); installing nine large pieces of limestone to respond to ISC architecture, allow access through the rain-garden, and provide seating; placing weed barrier and washed filter stone down as the base for two pathways (a formal walkway linking the ISC courtyard to the garden using stone salvaged from the Bayer Stone Yard, and a flagstone path along the south side of the rain-garden); placing three large limestone "splash-pads" atop silted-in dry wells; constructing a level-spreader to minimize concentrated flows as water exits the rain-garden; hauling in topsoil along the fringe of the basins; and planting approximately 250 dry to wet prairie and wetland plants (representing, for the most part, species common to the Flint Hills Ecoregion).



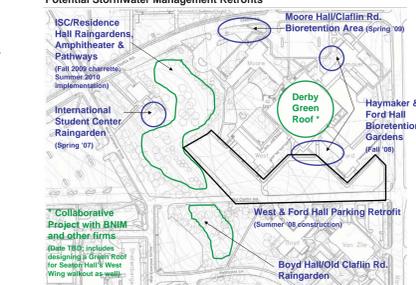
Oct. 27, 2006 Charrette work was posted in Seaton Hall for review by charrette teams and visitors -- including personnel from KSU Housing, Facilities, and Grounds.



Students worked closely during the Charrette with faculty, alumni, and local professionals from several different disciplines.



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Potential Stormwater Management Retrofits

Many potential stormwater retrofits were identified during the Fall 2006 Planning/Design Charrette. Possible projects and implementation dates were noted on the above image (prepared by Professor Skabelund at the end of the charrette) as a way to encourage dialogue and action by KSU staff and administrators.



Apr. 23, 2007

ISC Staff strongly supported rain-garden implementation and are helping maintain the garden. Faculty, staff, and students have been involved in maintenance of the rain-garden since project construction.

Apr. 28, 2007

This project has been made possible by WaterLINK and KDHE funding and by the generous donations of many donors and volunteers. Art works (three rain-bowls) were added to the garden in Spring 2008. The sculptural pieces temporarily capture rain-water, thus functioning as mini detention basins.

Apr. 28, 2007