

**South Platte River Urban Waters Partnership (SPRUWP)**  
**February 18, 2020**  
**Carson Nature Center, Littleton, CO**  
**Meeting Summary – FINAL**

**ATTENDANCE**

*Participants:* Bill Battaglin, Colin Bell, Taryn Boomgaard, Jennifer Charles, Janet Clements, Amy Conklin, Joseph Cordova, Rachel Crouch, Stephanie DeJong, Stacey Eriksen, Brad Evans, Sherry Fountain, Elizabeth Gallo, Sara Haney, Terri Hogue, Jeff Medaugh, Jordan Parman, Solomon Pomerantz, Donny Roush, Ryan Swartzentruber, Weston Toll, Summer Waters, Scott Williamson, Alison Witheridge

**Facilitation:** Sam Haas, Calley Schubert

**ACTION ITEMS**

<b>Weston Toll</b>	Send Sam the 2020 Forest Action Plan once it is published
<b>Amy Conklin</b>	<ul style="list-style-type: none"> <li>• Send Sam the BMW storm drain marking app event information</li> <li>• Send Sam the Urban Water Cycle Tours information</li> <li>• Send Sam Erin Jenkin’s email from Power BI to share with the Science and Data Subcommittee</li> </ul>
<b>All Partners</b>	Share any information on events, conferences, etc. with Sam to distribute in the monthly update email.

**PARTNER UPDATES**

Partners provided updates on projects, events, volunteer opportunities, grants, etc., related to SPRUWP.

***Metro Wastewater Reclamation District***

Metro Wastewater Reclamation District currently has volunteer opportunities to assist with biological sampling, including fish surveys and macroinvertebrate sampling, of the South Platte River in the fall. Anyone who would like to volunteer should reach out to Jordan Parman.

***City and County of Denver***

- The City and County of Denver hosted a full day urban watershed tour with Denver Water at the Kassler Center in Littleton on Wednesday, February 19. SPRUWP members were encouraged to talk to Donny Roush during the break if they were interested in joining the tour.
- The City and County of Denver’s Green Infrastructure Program will be working on a grant program with AmeriCorps to set up a longer-term maintenance strategy for green infrastructure facilities that involve training and educating Denver’s disadvantaged youth.

***Bluff Lake Nature Center***

Bluff Lake Nature Center is piloting a partnership with STEM Launch School. The partnership involves all grades visiting the Nature Center during the spring to learn about human impact on the environment through project-based learning.

### ***Denver Trout Unlimited***

Denver Trout Unlimited is working on obtaining funding for specific macroinvertebrate studies in areas where the river is about to be improved by private developers.

### ***Sara Haney***

Sara Haney was excited to be in attendance at her first SPRUWP meeting. She received her Master's in Urban Planning, Environmental Planning, and Policy; her thesis was focused on finding the qualitative and quantitative benefits of green infrastructure.

### ***Colorado State Forest Service (CSFS)***

- CSFS is currently working on the Forest Action Plan, a statewide assessment of forest conditions and trends in Colorado. This is a process that happens every ten years in all 50 states and US territories. The plan will be published this June.
- CSFS just completed their annual forest health report. The report is focused on insect and disease outbreaks in Colorado forests and will be published soon.
- CSFS will be awarding \$2,000,000 to 25 successful applicants through their forest restoration and wildfire risk mitigation grant program. This includes \$675,000 for treatment on 800 acres in the Upper South Platte Watershed.
- The CSFS Golden field office will be submitting a grant application for the Restoration and Stewardship of Outdoor Resources and Environment (ReSTORE) Colorado Program which is administered by the National Fish and Wildlife Foundation (NFWF). The proposed project focuses on forest restoration and elk habitat improvement on private and state land in the North Fork and South Platte Watershed, which complements the work CSFS is doing with Denver Water through their Forests to Faucets program.

### ***US Forest Service (USFS)***

USFS was able to secure \$50,000 to fund SPRUWP's water quality assessment tool (WQAT) update.

### ***Environmental Protection Agency (EPA)***

The EPA has had a lot of changeover in management.

### ***Groundwork Denver***

Joseph Cordova was excited to be in attendance at his first SPRUWP meeting. Groundwork Denver currently works with high school students in the field providing hands-on experience with water quality testing in the Bear Creek Watershed.

### ***Denver Urban Field Station (DUFFS)***

Ryan Swartzentruber was excited to be in attendance at his first SPRUWP meeting. The Denver Urban Field Station is conducting a stewardship mapping and assessment project. They are surveying all environmental stewards of the Denver metro area and building a repository of environmental stewards in the area. Reach out to Ryan Swartzentruber if you would like to join the list.

### ***Tri-County Health Department***

Jen Charles is the new water quality specialist and was excited to be in attendance at her first meeting.

### ***Barr Milton Watershed Association (BMW)***

- The annual Urban Water Cycle Tour will be held on Thursday, June 18.
- BMW held their first stakeholder meeting on Tuesday, February 18

- BMW will hold an informational meeting on the storm drain marking app on Thursday, March 26.

### ***Denver Water***

Denver Water has been working on building out their holistic source water protection program. Over the last few years, they have focused on incorporating data and looking at water quality in the Upper South Platte and the Upper Blue River and have now expanded to include Chatfield and Bear Creek.

### ***South Platte River Waterkeeper***

The South Platte River Waterkeeper is a new position; they were awarded a chapter at the end of October 2019. Their goal is to protect and restore the South Platte River.

### ***US Fish and Wildlife Service***

Solomon Pomerantz is the assistant project leader with the Colorado Fish and Wildlife Conservation Office. One project he is working on is with the National Fish Passage Program (NFPP). Solomon was excited to be in attendance at his first SPRUWP meeting.

### ***Red Rocks Community College (RRCC)***

- The Water Quality Management (WQM) program at Red Rocks Community College offers an environmentally focused bachelor's degree that is gaining momentum. All students have to do intern or capstone projects.
- The WQM program will be offering a water loss and re-use certificate for operators that begins in May. Those involved in the program will have access to an above-ground training lab.
- The WQM program just received a grant that will help get their mobile water quality lab up and running. The first pilot will be on the RRCC campus in April and will look at increasing the efficiency of their cooling tower by doing on-site desalination.

### ***Taryn Boomgaard***

Taryn Boomgaard is new to Colorado and excited to be in attendance at her first SPRUWP meeting. She was previously a hydrogeologist for the South Florida Water Management District and is currently looking for employment.

### ***Water Education Colorado***

- Water Education Colorado's annual River Basin Tour will be held in the Lower Arkansas River Basin this year on June 2 and 3.
- Water Education Colorado is hoping to hold an urban water cycle tour in Colorado Springs this year.
- The third edition of the Citizen's Guide to Colorado Water Quality Protection. It is available online as a PDF or for purchase through Water Education Colorado's website.
- Water Education Colorado completed their executive summary for the statewide water education action plan. They received a grant through the Colorado Water Conservation Board (CWCB) to begin implementation this year.
- On March 24, Water Education Colorado will hold their annual Water Educator Symposium. The focus of the symposium is to help water educators understand the tools available that can help to ease anxiety around issues such as climate change.
- The Project Water Education for Teachers (WET) Educator Workshop will be held on March 25.

### ***US Geological Survey (USGS)***

Bill Battaglin is a research hydrologist with USGS. He monitors studies of pesticides and emerging contaminants but is currently involved in urban phosphate monitoring.

### **WATER QUALITY ASSESSMENT TOOL UPDATE**

Sam Haas, Peak Facilitation Group, provided an update on the WQAT developed by the SPRUWP Science and Data Subcommittee.

- The Science and Data Subcommittee would like to update the WQAT to provide improved functionality, easier access that is more understandable to a general audience, and increased accuracy.
- Sam Haas provided SPRUWP partners with a written summary that includes priority, second- and third-tier updates compiled by the Science and Data Subcommittee. The technical components of the update will be completed by Leonard Rice Engineers, Inc., a water consultation company, and the updates will be completed by the person who originally coded the tool.
- The data shown on the WQAT tool is currently static from 2015; the subcommittee would like to update the tool by pulling data from the Colorado Data Sharing Network (CDSN).
- Additionally, the subcommittee would like to develop a user guide for educators to use the tool.
- Cost estimates to update the tool range from \$47,200 to \$69,550. Annual hosting and maintenance costs are estimated at an additional \$1,200 to \$1,500.
- CSFS and Denver Water have agreed to contribute \$55,000 collectively toward the update.
- Many of the updates will be completed by the person who originally coded the tool.
- Ryan Swartzentruber, DUFFS, has recently joined the Science and Data Subcommittee and is working to develop storylines as part of the tool update.
- Partners can reach out to Sam Haas if they are interested in contributing or know of grant or other funding opportunities to help with update efforts.

### **INCENTIVIZING GREEN INFRASTRUCTURE IMPLEMENTATION ON PRIVATE PROPERTY AND THE ECONOMICS OF GREEN INFRASTRUCTURE**

Janet Clements, Senior Water Resource Economist at Corona Environmental Consulting, presented her research findings and lessons learned from a project she led for the Water Research Foundation (WRF) about incentive programs for green infrastructure on private property around the country. She also presented a tool she is developing to help utilities and municipalities assess the triple bottom line benefits of green infrastructure. Her presentation is summarized below.

- The goal of the project Clements led for the WRF was to document lessons learned from around the country on utilities that have implemented incentive programs for green infrastructure and synthesize these lessons into a guidance document with in-depth case studies. Over the course of the project, Clements and her team conducted approximately 100 interviews with utility representatives, representatives from municipalities, members of the private sector, people who participated in these programs, and people who chose not to participate in the programs.
- The incentive programs were categorized into six different types: 1) Stormwater fee discounts, 2) rebates and tax incentives, 3) grant programs, 4) development incentives, 5) stormwater credit trading, and 6) awards, recognition, and certification.
- Clements is also working on an Excel-based tool with the WRF that contains extensive guidance that allows users to quantify and monetize the triple bottom line (TBL) benefits of green stormwater infrastructure (GSI). The information from the tool can be used to determine where to put green infrastructure and create projects that leverage the most benefits.

### **Cast Study: Montgomery County, Maryland**

- The first case study example was Montgomery County, Maryland in the Chesapeake Bay Area. This area is a Municipal Separate Storm Sewer System (MS4) community with a target to manage 50 impervious acres through green infrastructure. One way they attempted to reach this target was to offer a rebate program called RainScapes Rewards. The program contributed up to \$2500 per single family lot and up to \$10,000 for multi-family or commercial lot.
- Montgomery County recognized the need for people to implement and maintain the rain gardens and, as a result, they started a contractor training program targeting landscape professionals. Once the contractors were trained, they pitched the program to residents, filled out applications, and designed the rain gardens.
- Initially, the county covered the cost of the entire installation, but this led to residents believing the rain gardens belonged to the county and therefore thought the county should be responsible for maintenance. This was remedied by having residents pay a small fee which resulted in them feeling accountable for maintenance.
- Montgomery County struggled with reaching out to the commercial sector and decided to primarily focus on rain gardens and single-family properties. Over time the program has grown and now includes green roof rebates.
- The county found that faith-based properties were especially difficult to work with due to their decision structure. As a result, they started their Sacred Grounds program and saw an increase in participation.

### **Case Study: Philadelphia, Pennsylvania**

- Philadelphia is one of the leading municipalities in the green infrastructure space and has a consent decree that requires them to manage runoff from 10,000 acres through green infrastructure or distributed solutions. After realizing they would not be able to do this on public property, they implemented the Stormwater Management Incentives Program (SMIT). However, SMIT was not receiving a lot of participation, so the city also developed the Greened Acre Retrofit Program (GARP).
- Through GARP, Philadelphia funded project developers to recruit property owners. Philadelphia does not pay for the upfront cost to recruit property owners; they wait for the developer to present projects under an application and then pay the developer a set amount per greened acre. GARP has resulted in several project aggregators now working in this space and has helped increase economic development.

### **Case Study: Washington, DC**

- The third type of incentive program Clements presented was stormwater credit trading. Currently, Washington, D.C. has the only functioning stormwater credit trading market in the United States.
- As in any credit trading market, there is a buyer and a seller. In the context of stormwater credit trading, the buyers are the developers who need to meet stormwater management standards on site and the sellers are the property owners who voluntarily implement green infrastructure so they can sell that extra capacity in the form of volume-based credits.
- In D.C., the stormwater credit trading market has grown in the past few years spurring an influx of project aggregators and stimulating economic development. When designed correctly, this program can incentivize projects where they are actually needed, which is not necessarily where development is occurring. For example, in D.C., most properties that are subject to standards are impervious. By allowing requirements to be met off site, it may be

possible to better target or incentivize project sellers in areas where green infrastructure installations are needed.

### **Case Study: Grand Rapids, Michigan**

- Clements and her team are working with the Grand Rapids, Michigan wastewater department, who is also in charge of stormwater, to develop a stormwater credit trading program.
- Grand Rapids, Michigan is currently awaiting their MS4 permit, which has strong development standards. They have to retain two-year 24-hour stormwater (2.56 inches). The permit requires that the City has to provide an off-site compliant option. Developers are supposed to meet the 2.56 inches on site by using green infrastructure. If they cannot do that, they can look off site. If that is not available, there is the option to do underground retention or extended retention.
- There is enough area for supply, and currently Clements and her team are working with the City to figure out how to incentivize people to build projects. Grand Rapids has a bank of green infrastructure that can serve as an initial source of supply. If they roll out this market, they can sell their supply to stimulate the market.
- Clements and her team worked with the City to establish three trading areas based on hydrological considerations.
- One way to stabilize and stimulate participation is to bound the market with a floor price and a ceiling price; this design has been successful in D.C. and has the potential to work in Grand Rapids.

### **Case Study: Northeast Ohio**

- Every grant program in Northeast Ohio is run by the Northeast Ohio Regional Sewer District (NEORS).D).
- Northeast Ohio had issues spending the money through the grant program and wanted to demonstrate that they could incentivize projects that actually delivered co-benefits.
- Clements and her team recognized that Cleveland organizations and agencies interested in green infrastructure were not communicating, and Northeast Ohio was interested in exploring those relationships.
- The Trust for Public Land developed a tool called Climate-Smart Cities for green infrastructure decision making. Clements and her team started working with the Trust for Public Land and two Community Development Corporations (CDCs). One of the CDCs was interested in green infrastructure for various benefits but did not know how to start applying to a grant program and building a project. Clements brought in people from Parks and Recreation, the Office of Sustainability, additional CDCs, watershed organizations, and other stakeholders to begin developing a green infrastructure plan. The ultimate outcome was the development of a plan for the CDC to submit to the NEORS).D) to receive funding.

### ***Clarifying Questions***

Participants asked Janet Clements clarifying questions regarding her presentation. Questions are indicated in italics with responses below in plain text.

*Who runs and regulates the marketplace?*

In D.C., the D.C. Department of Energy and Environment are the permit holder of the MS-4. They try to be as hands off as they can, aside from setting ceiling and floor prices.

*Do potential applicants have to be within the sewer shed or a specific boundary to participate in the marketplace?*

In D.C., users do need to be within the district. They have a combined sewer area and a separate sewer area. There are not many combined sewer inflows because that is accomplished through grey infrastructure. Therefore, they are trying to incentivize people within the combined sewer area to purchase credits from outside so that they are getting the water quality benefits outside the combined sewer area.

*California has been working on a similar model, but they had issues getting the wetlands credit started. Is Colorado going to have a similar problem? If that is already moving forward, how can Colorado ride on those coattails?*

Wetlands training is a different yet similar concept. There are some tricky issues in Colorado. Colorado has strong regulatory standards and enough redevelopment to support the market. It can just be done on site rather than by purchasing credits.

*Is the Excel-based tool going to be used primarily by private owners?*

The tool is for municipalities or stormwater practitioners; it is focused on public green infrastructure.

*How is the GSI TBL Tool accessed?*

The draft of the GSI TBL tool will be released at the end of February 2020.

*Does Montgomery County, MD require that the rain gardens are inspected after implementation to ensure that they are creating the intended impact?*

Yes, they do need to pass an onsite inspection and they do have to submit a plan that is often completed by a trained contractor.

*Do any of these programs have monitoring data before or after the implementation of the program to see whether the program was effective?*

They monitor data, specifically in Philadelphia, which is under a consent decree. Unfortunately, the City's permit requirement is 10,000 greened acres, so they could say they greened 10,000 acres that may not actually be effective. In Philadelphia, the intent is to remove volume, while in Montgomery County the intent is to remove nutrients.

*Is Clements familiar with the Sun Valley Stormwater Options report on the SPRUWP website?*

Clements saw the report. She did a study for the EPA that used the report in a case study looking at communities and the economics of green infrastructure.

## **STORMWATER GREEN INFRASTRUCTURE LIFE-CYCLE COST ASSESSMENT DECISION SUPPORT TOOL**

Terri Hogue, Civil and Environmental Department Head at Colorado School of Mines and integrated decision support tool (i-DST) PI, and Elizabeth Gallo, PhD candidate, presented information about the stormwater green infrastructure life-cycle cost assessment decision support tool.

- The development of the i-DST is funded by the EPA. The goal of the project is to develop a tool that helps municipalities and decision makers determine the type of grey, green, and hybrid stormwater infrastructure systems they should implement based on hydrologic modeling, best management practices (BMP), life cycle cost assessment (LCCA), life cycle assessment (LCA), and estimation of co-benefits.
- The team developing the i-DST includes the Colorado School of Mines, the South Dakota School of Mines and Technology, University of California (UC) Berkeley, The Nature Conservancy (TNC), and Georgia Tech.

- The i-DST team receives feedback from a Science Advisory Board (SAB) of 20 urban water experts who help them identify tool needs, connect them with datasets, and identify grey and green infrastructure techniques to include.
- The tool is scalable; the Colorado School of Mines is primarily working on a bigger picture planning-level tool to help make decisions at the watershed level while their partners at the South Dakota School of Mines are working on a site-scale tool that can work on specific sites. The core of these two modules is a hydrologic model called the System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN), which is used to process the hydrologic data.
- The model allows the user to select the green infrastructure they want to put in the system and receive LCAs and LCCAs from the outputs of the model. The user will get a sense of what type of green or grey infrastructure is needed to meet their priorities.
- Hogue explained how time series from a simple hydrological model are formatted by utilities into data in the framework of the tool. This data then moves through the scenario builder, and LCCs associated with selected BMP types are outputted.
- Colorado School of Mines is focused on using EPA's SUSTAIN model, which has a built-in stormwater management model (SWMM), and a basic BMP simulation optimizer with built-in evaluation factors.
- While SUSTAIN is a great system, it uses a fairly outdated ARC platform and is no longer updated by the EPA. Additionally, SUSTAIN's available stormwater control measures (SCMs) are all green infrastructure.
- Liz Gallo, Colin Bell, and the team at the Colorado School of Mines have made their own updates to SUSTAIN. Updates include adding a number of hybrid-grey infrastructure SCM types to the model, adding a BMP decay rate calibration tool, and adding other evaluation factors.
- Gallo presented a case study she conducted in the Berkeley neighborhood watershed located in Northwest Denver. She built her case study off the work of Chelsea Panos, Colorado School of Mines, who has done extensive modeling in the Berkeley neighborhood watershed investigating the impacts of infill development on percent imperviousness (IMP). Chelsea Panos' research predicted that 15% of the total area in the Berkeley neighborhood watershed would be covered by future infill development increasing the runoff volume and flooding.
- Gallo applied the i-DST tool to Chelsea Panos' study to discover the optimal suite and number of SCMs to return to current baseline flow volumes in this watershed, the benefits and tradeoffs of greener to greyer SCMs offered in the tool, and how the varying priorities of stakeholders shift the optimal storm water management plan.
- Gallo used two time series from water years 2013-2017 of the current baseline and the future baseline which had +4.7 % IMP to set up the water quantity piece of the model.
- In order to set up the water quality piece of the model, she used the land use area weights average for total suspended solids (TSS), total phosphorous (TP), and zinc (ZN) to find the event mean concentrations (EMCs) for the current baseline, the future baseline that is the non-redeveloped area, and the future baseline that is the infill developed area.
- Additionally, Gallo used three greener SCMs and three greyer SCMs in setting up the model. The three greener SCMs used were bioretention (BR), vegetated swale (VS), and infiltrated trench (IT). The three greyer SCMs used were underground detention (UD), underground infiltration (UI), and porous pavement (PP). There is a continuum of greener and greyer based on the design of the SCM, so some may classify porous pavement as greener, but in this scenario, it is considered greyer.



- In Denver, they do not recommend using underground systems, but with the high-density buildings being built in the Berkeley neighborhood, they may need to consider underground infrastructure beneath a parking lot, driveway, etc.
- Using a conceptual picture, Gallo described how the data was set up in the model. The time series, or the water quantity and quality flow, from the redeveloped area is sent to an aggregate BMP while the time series from the non-redeveloped area goes straight to the outlet. The optimizer uses the outlet time series with the BMPs and a summary of evaluation factors for a number of different solutions is provided.
- In the Berkeley neighborhood watershed, 2,000 solutions were simulated, and each solution has a different number of BMPs in the aggregate BMP. This shows that if the suites in the number of BMPs is changed, the final time series is affected. Plotting this information into a pareto curve shows that cost and evaluation factor changes based on the number and types of SCMs there are.
- Gallo presented two different types of optimization analyses and their results. Optimization analysis one was individual and demonstrated that implementation of different numbers of one type of SCM effects the evaluation factor. The results showed that the greener and greyer SCMs have a mixed hydrologic performance, which proves UI will produce the average annual flow volume (AAFV) goal with the smallest number of SCM units. Additionally, the results show that VS reaches the same goal at the cheapest cost, demonstrating a tradeoff between UI system and VS. The water quality results show TSS, TP, and ZN plotted with load and concentration. The results show that all SCMs reduce pollutant loads and some SCMS increase pollutant concentration. Therefore, when removing the cleaner water with SCMs, the concentration of pollutants at the watershed outlet is increasing. If a user is only looking at mitigating stormwater impact from redeveloped areas, they might need to consider plotting the whole watershed to balance the effect. Additionally, all SCMs have mixed results across a number of hydrologic criteria; consider multiple SCM types and criteria in order to maximize social and environmental benefits in the watershed.
- The second analysis was a full optimization analysis that used all six SCMs in each solution and shows 2000 unique suites of SCMs for the Berkeley neighborhood watershed. Plotting each unique suite yields a pareto curve that could help someone determine the best solutions based on their needs. The solutions that perform best are throughout the whole curve and are not just concentrated at the elbow of the curve where the evaluation factor on the Y axis is maximized and the cost on the X axis is minimized. A net aggregation approach was applied to select and compare the solutions. Ten different cost bins were created, and benefits were weighted and normalized for each solution; solutions were then given an overall score. Two different sets of ratings were given to the criteria being reviewed. The results showed that all solutions change between the two sets of ratings, and there is a shift in the SCM types. Additionally, greener is dominant in almost all cases. To maximize environmental and social benefits and other criteria in the watershed, a mix of SCMs should be implemented.
- In this analysis, the final output is to take the curves and compare the hydrologic criteria to each other. To continue to the next step, apply LCC, LCCA, and co-benefits to this final analysis.
- Gallo presented briefly on a tool designed by Emily Grubert, Georgia Tech. This tool allows the user to take design of the SCMs and put it in into a module that gives total system cost estimates for fifty years of service for each SCM type. This can be broken down by only financial and also financial and monetized environmental cost. The tool also shows LCC by life cycle stage, and that includes design and planning, construction, operations and maintenance, and also end of life cost. Additionally, it shows LCC by cost type and that includes materials, labor, equipment, energy, other direct costs, and environmental costs.

- There are limits to incorporating benefits into stormwater modeling. While hydrologic process-based benefits are straightforward to measure, vegetation-based benefits require knowledge of surrounding urban green infrastructure such as tree canopy, parks, and open space. More research needs to be performed before vegetated benefits can be linked to SCM outcomes in a scientifically sound way.
- The i-DST team has quite a bit of published literature and some that are in review; they are happy to share any of these with the group.
- The team will be at the American Society of Civil Engineers (ASCE) Low Impact Development (LID) conference in July where they will be doing a BETA testing.
- SPRUWP members can feel free to reach out to the i-DST team at Colorado School of Mines for any additional information.

### ***Clarifying Questions***

Participants asked Terri Hogue and Liz Gallo questions regarding their presentation. Questions are indicated in italics with responses below in plain text.

*It is interesting that Colorado State University (CSU) and Colorado School of Mines, which are both in the semi-arid state of Colorado, were selected to work on the tool. Was there a reason for this?*

Both the CSU team and the Colorado School of Mines team offer different approaches and data. The fact that they are both located in the semi-arid state of Colorado is irrelevant because the tool needs to be applicable nationwide.

*Were the researchers surprised there was no obvious answer in the pareto curve?*

Gallo has done an extensive amount of pareto sensitivity analysis and has researched how different inputs can change the shape and design of the curve. Her input data was based on the average redeveloped area in Berkeley so that gave it more of a straight shape rather than a real curve where, for example, you could force too much water into one BMP.

*Is the CO School of Mines team familiar with the Center for Neighborhood Technology based in Chicago? It is a nonprofit organization that does a lot of work quantifying the social benefits such as air quality and could be a good resource.*

It is difficult to find research on the types of benefits that are difficult to quantify. The team hired Qualtrics to conduct a survey for a paper that is currently in review; they received some interesting results that Katie Spahr will be talking about at the ASCE LID conference in July.

*A group member pointed out that the EPA Natural Capital tool has a lot of useful information from studies conducted by CSU on ecosystem benefits.*

*What is the range of pollutants that can be tested using the tool?*

The user can simulate any types of pollutants they would like to test, but they need to provide the water quantity and EMT data to the tool; it will not provide that information for the user.

### **NEXT STEPS**

- The next SPRUWP meeting is on Tuesday, May 19 from 12:30pm – 3:30pm.
- Sam will redistribute the Google Sheet for group members to sign up to present or share presenter recommendations.
- New group members should reach out to Sam with any questions as [sam@peakfacilitation.com](mailto:sam@peakfacilitation.com)