



***Bringing Conversations on Diversity, Equity, and
Inclusion in the Data Sciences to the
Environmental Sciences***

An NSF INCLUDES Conference



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About the Conference

Bringing Conversations on Diversity and Inclusion in Data Science to the Ecological and Environmental Sciences, was a 3-day conference hosted at the University Corporation for Atmospheric Research's (UCAR) Center Green in Boulder, Colorado, April 2-4, 2019. The conference had two primary goals:

- To develop a networked improvement community with representatives from academia, government agencies, non-profit organizations, and the private sector who are interested in promoting diversity, equity, and inclusion (DEI) across the environmental data science field.
- To promote and support initiatives across existing alliances and organizations that facilitate diversity, equity, and inclusion across environmental data science careers through collective action.

Through networking and focused conversations that occurred at the conference, attendees decided to form a new network: the Environmental Data Science Inclusion Network (EDSIN; edsin.qubeshub.org). EDSIN is committed to making progress in DEI across the environmental and data science fields through a growing membership, collaborating organizations, and ongoing programs.

Participant Recruitment and Selection

As an INCLUDES conference, broadening participation in STEM was a key focus of the event. To that end, recruitment and selection of conference participants was done in a way to ensure diverse perspectives were represented during the discussions. Conference leadership worked with the conference organizing committee to identify and invite individuals with relevant expertise. Staff and committee members recruited additional conference applicants through direct emails, listservs, and social media posts, with emphasis on organizations working with individuals underrepresented in STEM. We had 202 full applications and 58 partial applications submitted with space for approximately 100 participants (see Appendix A). Considering the application period was only open for one month, this demonstrated strong interest in the topics being presented and discussed at the event.

Any individual that was invited and applied to attend the conference was selected as a participant. The remaining applications were independently reviewed by three members of the conference organizing committee using a rubric based on the goals of the conference and those of the broader INCLUDES program. To ensure broad representation and diverse perspectives at the conference, the committee sought to ensure that attendees represented a broad range of: career stage, professional role, institutional affiliation, and geographic distribution. Additional considerations included if the applicant is or has been involved in an NSF INCLUDES project and whether the applicant was known to have first-hand knowledge of barriers faced as an individual underrepresented in STEM. Final decisions were made following a conference organizing committee meeting to review applicant selections. The conference was at capacity with 104 participants (Appendix B).

Conference Structure

The conference organizing committee took special care in pulling together an inclusive event that provided a safe space for all attendees. To do this, a code of conduct was developed early for

reference by conference attendees and the growing network (Appendix C). The code was posted to the network website with an invitation for members to provide feedback. A printed version of the code was also made available at the conference registration table and reviewed during the conference's opening remarks.

The committee also wanted to ensure there was plenty of time to provide any special accommodations requested by attendees. Two months before the conference, a conference registration form was sent out to all participants that requested information on special accommodations, including lodging needs, dietary restrictions, and other conference requests (Appendix D). At the conference venue, gender neutral restrooms and on-ground reflection spaces were designated.

Committee members also wanted to provide multiple opportunities for all attendees to share information on their programs and/or organizations during the conference event. As part of the conference registration, everyone was invited to share a title and abstract if they wished to present a poster or five-minute lightning talk and asked if they had interest in bringing materials to distribute. All presentation titles and abstracts as well as organizations that brought materials to share are listed in Appendices E and F, respectively.

Based on recommendations from the conference organizing committee, a pre-determined conference agenda with plenary speakers was combined with an unconference format for breakout discussion sessions. An unconference format allowed attendees to determine the breakout session topics and, by doing so, demonstrate where needs lie within the community. Therefore, the conference registration form also asked attendees to recommend breakout sessions of interest. This resulted in some of the sessions being pre-determined but allowed others to be proposed during the event. This format resulted in 6 plenary presentations, 17 lightning talks, 12 posters, 1 panel discussion, and 46 breakout sessions.

To allow opportunities for networking during the conference, two 30-minute breaks were offered mid-morning and mid-afternoon each day in addition to a one and a half hour lunch break. On the first day, the mid-afternoon break was replaced by an evening networking event. The event, hosted at Google's offices in Boulder, included representatives from co-sponsors Google, the National Center for Women and Information Technology (NCWIT), and the University Center for Atmospheric Research (UCAR). In addition to conference participants, 31 other individuals attended the networking event.

Considering the strong interest in the event and our inability to accept all applicants to attend in-person, all the plenary presentations were live streamed with live closed captioned. Anyone who applied but could not attend was invited to participate in the conference remotely via the live stream and a social media backchannel (#EDSIN2019) that was run by undergraduate students from Bates College. Prior to the conference, as part of a course focused on engaging online communities, the students set up social media accounts for the network, posted to the accounts, and facilitated discussions on the conference website. The conference livestream had 68 unique viewers over the course of the three days, with an average of 30 viewers each day.

Priority Areas Identified

A conference proceedings working group (see acknowledgements) was formed after the conference to review and synthesize notes taken during the 46 conference breakout sessions. Summaries were broken into eight priority areas: Accessibility, Allies, Data Ethics, Training, Community Relevance, Culture Change, Professional Development, and Recruitment and Retention. These summaries only include input provided by attendees on these topics with no external references provided. However, we want to acknowledge that there were voices/perspectives missing from these conversations that are not included here. In addition, some detailed insights were excluded in order to summarize the content but more details from these conversations will likely be shared in future network products.

Accessibility

This priority area focused on the need to make data science training programs and tools accessible to everyone. An underlying theme throughout these discussions was how we define access in comparison to accessibility. Both are important but they are different issues that require different approaches to be addressed. In regards to access, participants discussed financial and educational barriers that has led to the current digital divide and raised concerns regarding the affordability of new technologies, the lack in variety of educational opportunities for diverse students, and low community awareness of opportunities to overcome these barriers. Accessibility was largely defined as physical spaces and interactions with educational content created and distributed according to the principle of universal design. Universal Design for Learning (UDL) is an established framework that focuses on the development of educational courses and resources with all students in mind that was widely referenced as a framework to be adopted broadly across programs.

Allies

Several breakout sessions focused on how individuals could serve as allies for others to promote DEI in their workplace, recognizing that more resources and professional development opportunities are needed on how to be a good ally. To begin these discussions, it was important to define what was meant by “ally.” A definition (i.e., a person, recognized by others, as being a member of one group but supportive and open to individuals from other groups) and several qualities of an ally were provided:

- Speaking up for a peer when something derogatory or hurtful is said at their expense even if they are not in the room
- Never minimizing what others are experiencing
- Putting your privilege to work for marginalized people
- Recognizing when someone needs an ally
- Recognizing that being an ally is a commitment that requires bravery and often discomfort
- Recognizing power and privilege and acknowledging it
- Elevating someone’s voice instead of speaking for them
- Not minimizing the experience of others or simply being a bystander
- Giving diverse individuals power, enabling them to enact change
- Staying up to date because the conversation continues to change

- Recognizing that advocacy shouldn't become appropriation and allies need to learn to navigate effectively to balance between the two
- Constantly learning and being responsive to what others experience
- Open to asking questions and acknowledging what you don't know
- Pushing oneself to improve their ability to respond in these types of difficult situations
- Establishing "safe," accepting spaces
- A listener, open to learning from other people.

Community Relevance

Researchers and educators need to identify ways to demonstrate the relevance of environmental and data science fields to diverse communities. This can be accomplished in several ways but requires continuous engagement with community partners that can support connecting individuals to relevant programs. It can be useful to have a member of the community as part of any recruitment program, especially if these individuals are considered "boundary spanners." This term was a focus of one of the plenary presentations and taught attendees the importance of those individuals that can form bonds between two communities as a member of both. All science programs can also demonstrate greater relevance to a community by incorporating community and cultural aspects into their research and relevant programs. This is accomplished by building relationships and working with communities to frame research questions together. Defining a common language from the onset can facilitate conversations and support development of a mutual understanding on multiple topics. Family members and guardians can also have a significant impact on an individual's career trajectory, so it is also important to communicate how pursuit of an environmental data science career can address community priorities while also providing job opportunities.

Culture Change

This priority area focused on how managers and administrators need to internally practice and promote best practices for cultural change to better support DEI within their organizations. These discussions identified questions these organizations could ask to understand their current culture and how to improve it:

- What counts as data and high quality data? Does data from practitioners not 'count' in the same way as data from researchers in academia? Are multiple ways of knowing recognized (e.g., traditional ecological knowledge)?
- Who has power in the organization? Is the power structure hierarchical or collaborative?
- Are DEI efforts extending beyond recruitment?
- Are disability and accessibility being considered as part of DEI?
- Is literature/evidence on DEI being shared and welcomed?
- Are there ways to connect allies and mentors with new hires/recruits into an organization?
- Are there required goal-setting and reporting activities on a regular (e.g., annual) basis?
- Is time spent on DEI activities allowed and valued? Is it part of promotion and retention - and if so, does it count positively towards that? If not, can it be incentivized through evaluation criteria?
- Do people within the organization have expertise on different DEI topics? If not, is the approach to retrain or bring in new people?

- Does DEI feel hollow because the upper levels of the organization are not diverse?
- Do people get angry/defensive when DEI issues are raised?
- What processes protect people who raise DEI concerns from retaliation?
- Can outside organizations (e.g., funders) help push an organization through their own policies and DEI commitments?
- Does the organization understand the value of DEI (not deficit) and is that reflected in the mission, strategic plan or other important organizational documents?
- Do hiring practices help or hinder DEI goals? Can they be changed through salary incentives or targeted questions? Is the hiring committee itself diverse?
- Are cultural competencies explicitly valued in hiring (e.g., multilingualism)?
- Are evaluation metrics being used for individuals potentially biased in ways that harm DEI (e.g., SAT scores)?
- Is an organization not adequately funding DEI? Why or why not?
- Is the organization building long term, authentic (non-extractive) relationships with communities?
- Is there an overreliance on gender in DEI, which historically has disproportionately benefited white women?

Data Ethics

This priority area noted that data ethics need to be continuously promoted in all aspects of data collection, distribution, analyses, and dissemination and be integrated into all aspects of data science education. Discussions on this topic centered on the power dynamics associated with access to big datasets as well as the ability to analyze and interpret those data. It is widely known how data have been misused by those in power to profile individuals and communities based on their vulnerabilities, to discriminate, or cause political or social harm. Established norms need to be identified within communities for how data should be handled and by whom so the data do no harm. Some specific concerns that need to be considered include: Who owns the data, who can access and use it?; Who can appropriately interpret the data?; What are the mechanisms by which one gets permission to use the data?; and What data would communities like to protect and what would they like to share?

Education and Training

This priority area identified the need to develop culturally and socially relevant data skills training curricula for students at all education levels and have them delivered through best practices of inclusive pedagogy and improved through culturally responsive evaluation. Doing so will help students better understand the value of data science in their education, career paths, and the impact to their communities. Additional discussion included how data literacy should be defined, what skills are required, and what should be achieved at different education levels. There are barriers that need to be addressed that are associated with rapidly changing technologies that result in constantly evolving skill sets required to be successful. Instructors need to be open to teaching students with varying skills and backgrounds so they have equal opportunity to be successful. Data science should not be siloed but be integrated into existing courses and programs to demonstrate how the knowledge and skills can be broadly applied in different contexts.

Professional Development

Breakout session discussions prioritized the need to have professional development provided to instructors and leaders of relevant programs on inclusive pedagogy and best practices. Conversations focused on three key audiences.

Data Science Training for Faculty and Academic Staff: The fields of data analytics and data science are moving very quickly, making it hard for faculty and academic staff to keep up. Faculty and staff need training in data analytics and/or data science and its application to environmental and Earth science, as well as to social science. For a more integrated approach, it would also be beneficial to incorporate DEI training into the data science curriculum. To successfully obtain data science skills, however, faculty and academic staff need training courses that are designed for their needs, i.e., such as after-work courses that are geared towards returning professionals. Faculty and academic staff also need to be afforded the release time from their institutions, as well as the support and air cover for taking the risk of being a “lone innovator.” Workshop participants identified the need for “train the trainer” sessions, such as the Data Carpentry training classes. Four-year institutions could partner with 2-year community colleagues and minority-serving institutions to provide much needed training. Some institutions, like the University of California at Berkeley, have paired data scientists with faculty and academic research staff for semester-long collaborative projects that enable academic researchers to upskill and experiment with new data science tools for their own research. Students also need to be trained in data analytics, data science, and statistics in parallel to their chosen field of study.

Cultural Intelligence and DEI Training: Faculty and academic staff also need training in “cultural intelligence” so they are less fearful and more aware and confident in working with students and colleagues from diverse backgrounds. Cultural support systems should also be integrated into all aspects of a program (e.g., housing, travel, and education). Network members may want to advocate that NSF require all principal investigators to receive cultural and DEI training.

Resources and Curriculum: EDSIN may want to consider compiling a resource bank of existing resources and curriculum, vetted for their inclusivity and cultural relevance. These resources should include metadata and evaluation data on how well the curriculum was received with various groups of students. EDSIN, for example, could work with groups such as the Data and Software Carpentries, the Academic Data Science Alliance, the National Academies of Sciences, Engineering, and Math, and the Earth Science Information Partners to develop and share curriculum for data science, community-based CUREs, and research related to environmental and Earth science. The curriculum could be differentiated and scaffolded, and leverage innovative best-practices and pedagogies (e.g., active, flipped, project-based). For example, there is a need to develop data science curricula for a social justice general education course, using community-based data. EDSIN and academic institutions also will need to ensure that data, tools, and resources are open and readily accessible to students, faculty and staff across a diversity of backgrounds. For example, see CUREs:

https://serc.carleton.edu/eddie/enviro_data/index.html

Recruitment and Retention

This priority area focused on the need to do more to recruit and retain minority students into environmental and data science fields through internship and mentoring programs. Parents, peers, and community members should be engaged to demonstrate community relevance and opportunities for a

successful career. In many cases, they will be more effective recruiters than faculty members. Partnerships with organizations serving these students (e.g. Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), American Indian Higher Education Consortium (AIHEC), Hispanic Association of Colleges and Universities (HACU), Center for the Advancement of STEM Leadership (CASL)) can offer programs that support students entering these fields. Recruitment could also be aided by getting potential students on a campus, having them take higher level courses in high school, and offering opportunities to visit a workplace to shadow employees. Sharing career pathway case studies, experiences from alumni, and relevant opportunities can also be beneficial. We need to utilize culturally relevant pedagogy to help students succeed. For example, courses could provide scientific and medical terms in Spanish.

Barriers to entry should also be considered. Grade points averages and standardized tests can limit success for many students. Minority students often do not form STEM identities due to a lack of opportunity and exposure, which perpetuates a deficit perspective. For example, at bilingual and bicultural institutions (e.g., University of Texas Rio Grande Valley), students have viewed bilingualism as a deficit versus an asset. The unique needs of students need to be addressed, their motivations, fears, doubts, needs. How do we address/support these things? What tools do we have? What do we need? For many students, it is all about creating a sense of belonging. The faster they feel like they belong, the better the chances of retention. If it takes a year or more to feel like they belong, they are likely already thinking about leaving.

Representative, diverse staff are needed to serve as role models and mentors. If students don't see themselves reflected in the field, they won't see a place to participate. Find champions to provide encouragement, and showcase realistic (vs. our perceptions, biases) expectations for applying for opportunities, instill confidence, and increase familiarity with the skills students will need.

As programs are put into place, longitudinal data should be collected to better understand measures of success: retention, graduation rates, moving on to graduate school, graduating from graduate school, moving into a job in the field. We have to be intentional, have relevance to who we are building our programs for moving forward.

Conference Outcomes

After the conference ended, a post conference evaluation was sent to all attendees (Appendix G). The survey collected data on participant demographics; participant satisfaction with the conference and tools utilized; their overall experience; and to what extent they plan to engage in future EDSIN activities. We received 81 responses to our post conference evaluation, a 78% response rate.

Demographic data showed that 35% of attendees identified as a member of an underrepresented group in STEM, 71% identified as women, and 9% identified as having a disability. We had no attendees that were actively serving in the military or military veterans. When asked, many participants indicated that participant diversity was one of the most valuable aspects of the conference, resulting in quality, open conversations that allowed individuals to share and learn from each other. One participant wrote: “The participants selected were diverse in every way. I found the opportunity to connect and learn from people I never see at other conferences (or in my day to day work) highly valuable.” Another wrote:

“I came to the EDSIN conference expecting to have typical NSF conversations on how we get more diverse audiences to consider data science careers related to environmental data. I have over 25 years with both environmental science and diversity programs. However the audience EDSIN brought together- an amazing diverse group of people talking about DEI in STEM, how we change the world of STEM, data--it’s value to communities and protecting it plus the stories it can tell and who’s stories those are, environmental research and coproduction. I was blown away.”

At the same time, other participants felt more perspectives should have been represented and that more people of color should have been involved in moderator and leadership roles.

A primary goal of the conference was to develop a networked improvement community with representatives from diverse affiliations who are interested in promoting DEI in the environmental and data science fields. To do this required retaining members of the EDSIN community after the conference ended. We asked a series of questions (Table 1) to gauge retention, and a majority of participants indicated satisfaction with their experience and intentions to stay engaged with EDSIN following the event (~78%; Table 1).

Table 1. Percentage of survey respondents that disagreed or agreed with the following statements related to their participation in the conference. Percentages do not add up to 100% due to neutral and blank responses.

| Statement | Disagreed (%) | Agreed (%) |
|--|---------------|------------|
| The conference met my expectations. | 5% | 86% |
| Participation in the conference was worth my time. | 4% | 94% |
| My personal goals for attending the conference were met. | 6% | 80% |

| | | |
|--|----|-----|
| The presentations were informative. | 1% | 94% |
| The presenters were knowledgeable about their topics. | 1% | 93% |
| The breakout discussion sessions were informative. | 4% | 85% |
| My contributions to discussions were heard and valued. | 4% | 86% |
| I identified collaboration opportunities with new colleagues. | 6% | 74% |
| I intend to stay engaged with EDSIN now that the conference is over. | 6% | 79% |
| I intend to contribute to the after-conference activities of EDSIN. | 7% | 78% |

We also wanted to get a sense of how satisfied participants were with the logistical aspects of the event including the agenda, networking opportunities, and the platform we adopted for facilitating conference collaborations (i.e., QUBESHub) (Table 2). Generally, a large majority of participants were satisfied with their experience. Networking was listed by multiple participants as the most valuable aspect of the conference. One participant wrote: “Bringing people together for face-to-face meetings and conversation was so wonderful, as I mostly interface with the themes of the conference by reading what geographically disparate folks are saying about it. It was powerful to be in the same room.” Another wrote:

“The format and agenda worked extremely well for achieving outcomes or at least roads to outcomes. I was unsure at first, but the adaptability and responsiveness of the discussion group topics made me feel engaged and valued while also helping me get to know individuals. The final 2 hours of the conference was also quite impressive; pulling out take-aways, creating working groups AND action plans. I don’t think I’ve ever left a 3-day conference feeling the “next steps” so strongly.”

Only 52% mentioned being satisfied with the networking event at Google (Table 2). Comments indicated that, after a long day, most participants wanted to just network during this time without additional presentations being given. There also seemed to be a disconnect with what was offered at the networking event with participant expectations. Seventy percent of attendees were satisfied with use of the QUBESHub platform for collaboration (Table 2). Comments stated that participants liked the way the platform provided opportunities to contribute more fully to the breakout sessions through collaborative note taking and to support file sharing among working groups. There were some that ran into challenges using the platform, finding it not intuitive and difficult to navigate while others were not willing to adopt a platform in addition to the ones they already use.

Table 2. Percentage of survey respondents that were dissatisfied or satisfied with each of the following relevant to their participation in the conference. Percentages do not add up to 100% due to neutral and blank responses.

| Statement | Dissatisfied (%) | Satisfied (%) |
|--|------------------|---------------|
| Interactions with conference leadership | 5% | 91% |
| Communications on conference logistics | 5% | 95% |
| Keynote presentations | 4% | 96% |
| Networking event at Google | 16% | 52% |
| Time made available for networking at conference | 4% | 88% |
| Conference venue | 5% | 90% |
| Food at the conference venue | 5% | 84% |
| EDSIN group on QUBESHub website | 5% | 70% |

One of the conference outcomes was to increase awareness of existing initiatives and available resources to individuals and organizations interested in DEI within the environmental and data science fields. Data indicated that the keynote presentations were very effective at doing this followed by the lightning presentations and breakout discussion sessions (Figure 1). The Google networking event and social media posts were the least effective at delivering this outcome (Figure 1). Social media posts were more geared at increasing awareness of the conference and engaging remote participants than increasing awareness of specific initiatives and resources.

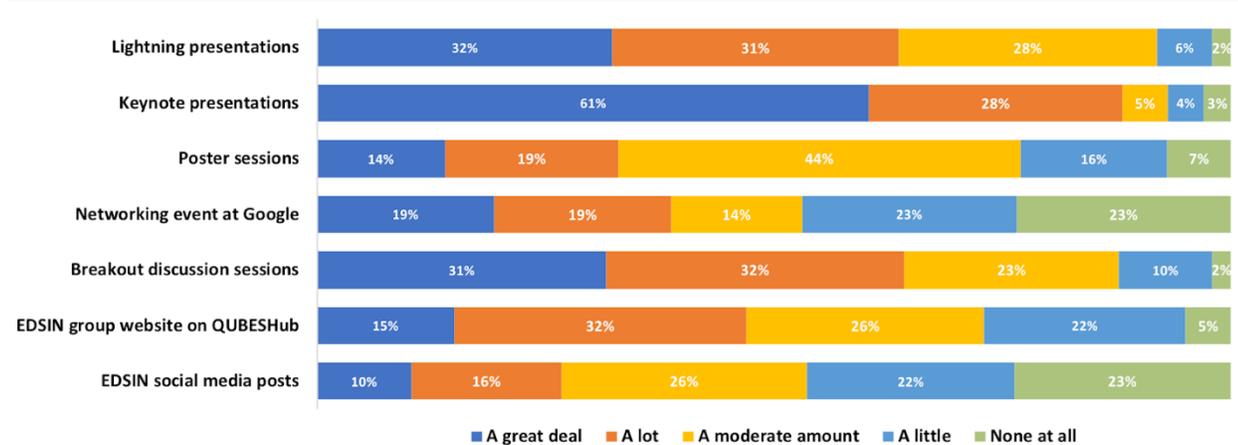


Figure 1. Percentage of respondents (N=81) indicating to what extent each of the following increased awareness of initiatives and available resources relevant to EDSIN.

The survey also demonstrated that most participants found the conference to influence the ways in which they thought about DEI across STEM fields either a great deal (52%) or a lot (25%; Figure 2). One participant noted: “The honest sharing of perspectives was so valuable. I’m still thinking about (and acting on) the conversations from the conference.” Another stated: “Between the breakout sessions and presentations, my understanding of the importance of the diversity in STEM and how to address diversity in STEM greatly increased! I plan to incorporate what I have learned going forward in my career.”

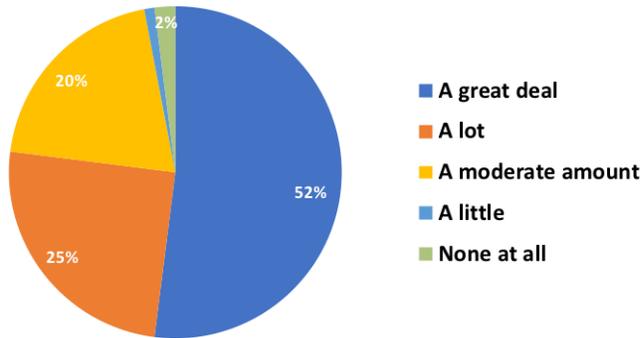


Figure 2. Percentage of respondents (N=81) indicating to what extent the exchange of ideas that took place at the conference influenced the ways in which they thought about DEI across STEM fields.

Recommendations for Improving Future Events

The need for trained moderators was highly cited as something missing from the conference. Considering the nature of these types of conversations and the importance of creating a safe space to have them, future events will need to make professional moderation a priority and include appropriate budget to support it. This will ensure issues of power and privilege are addressed in the moment by setting community expectations and rules of engagement from the onset and ensuring those rules are followed. It will also ensure discussions have clear direction and move forward in a manner that is productive. Participants not needing to serve as facilitators and note takers would also allow them to fully participate in the discussions.

A shared language is also important when having these discussions and some participants felt more should have been done so participants started with similar definitions of equity, diversity, inclusion and social justice within the context of the conference topics (data science, environmental science). In addition, some felt there was ambiguity or jargon in the session titles that made it difficult to know what the session would be about. Detailed descriptions were needed to match participant expectations and to better guide the direction of the discussions.

Listening and participating in these conversations can leave participants feeling physically and emotionally drained. More time could have been allocated for breaks to support that need. In addition, lodging for participants was not within walking distance to the conference venue. This eliminated the ability for participants to return to their rooms for shorts breaks if needed. Building time for reflection in

the agenda could replace some of the networking breaks and breakout discussions for participants to reflect on things learned and time to plan out actions stemming from these lessons.

Considering the diversity of perspectives represented, everyone had their own personal agendas for the topics they most wanted to explore and discuss with colleagues. The unconference format supported flexibility in providing opportunities for everyone to identify and participate in discussions in which they had a lot of interest, but some participants felt that certain topics still needed additional exploration. This included having a deeper dialogue around challenges and opportunities in the data science space for Indigenous communities and when exploring the intersection of DEI with data science and environmental science.

Appendix A: Conference Application

NSF INCLUDES Conference: Bringing Conversations on Diversity and Inclusion in Data Science to the Environmental Sciences

Diversity and inclusion in STEM is a core tenet of the NSF INCLUDES program. Diversity is considered in all its aspects as the program aims to ensure STEM professionals are representative of the populations they serve. The NSF INCLUDES Conference, *Bringing Conversations on Diversity and Inclusion in Data Science to the Environmental Sciences*, is an opportunity to bring together existing communities and organizations to improve the recruitment, training, and retention of underrepresented groups in data science with an environmental science emphasis.

Please answer the following questions to be considered for participation in the conference which will be held at UCAR's Center Green conference facility in Boulder, Colorado on April 2-4, 2019 and hosted by the [National Ecological Observatory Network](#). Please note that applying to the conference implies a commitment to attending all three days. Partial and full funding support to attend is available for interested applicants.

For an overview schedule of the conference and more information, please visit the [conference website](#). We will be updating information on this site as it becomes available.

All applications for the conference must be received by October 1 and selected participants will be notified in early to mid-November depending on the number of applications received. Priority consideration will be given to applicants who can make significant contributions to discussions surrounding data science, the environmental sciences, and diversity, equity and inclusion across STEM fields. Applicants from historically underrepresented groups and minority serving institutions are strongly encouraged to apply.

You can come back and edit your application as many times as you like by returning to this URL using the same computer and web browser. Once you click, "Submit," you will no longer be able to edit your application.

If you have any difficulties filling out or submitting the application or have questions about the conference, please contact [Alycia Crall](#).

Please provide us with your name, email, and affiliation.

- Name _____
- Email _____
- Affiliation _____

Are you or have you been involved in an NSF INCLUDES project?

- Yes
- No

Display This Question:

If Are you or have you been involved in an NSF INCLUDES project? = Yes

Please tell us the title of your INCLUDES project:

Display This Question:

If Are you or have you been involved in an NSF INCLUDES project? = Yes

What is your role on the project?

- Lead PI
- co-PI
- Program evaluator
- Other investigator
- Post doc fellow
- Student
- Other _____

Display This Question:

If Are you or have you been involved in an NSF INCLUDES project? = Yes

Elaborate in a few sentences about your role on the project.

Are you involved in any other projects or networks relevant to the conference topic?

- Yes
- No

Display This Question:

If Are you involved in any other projects or networks relevant to the conference topic? = Yes

Please provide the name of the project/network, your role, and a link to more information (where applicable).

During the afternoon sessions of the conference, attendees will identify and prioritize topics for breakout discussion sessions relevant to diversity and inclusion in data science careers. The questions below will help us ensure that attendees have a breadth of knowledge and experience within these areas.

Please select the category below that *best* describes your affiliation.

- University
- Community college
- Minority serving institution
- Federal government agency
- Local or state government agency
- Non-profit organization
- Private sector
- Other _____

Which of the following describes your *primary* professional role in relation to the conference topic?

- Practitioner (e.g., educator, employer, mentor, project leader)
- Researcher
- Evaluator
- Other _____

Which of the following groups do you tend to work with? Check all that apply.

- K-12 students
- Undergraduates
- Professionals seeking opportunities in their current career
- Professionals seeking opportunities to change careers
- None of the above

In which of the following areas do you feel you have expertise? Check all that apply.

- Data science
- Data science, with emphasis on the environmental sciences
- Bringing awareness, raising interest, and/or recruiting underrepresented groups into STEM fields

- Developing mentoring programs that support retention of underrepresented groups in STEM fields
- Developing data science skills training programs (e.g., courses, professional development offerings, internships)
- Workforce development
- Evaluating STEM programs that serve underrepresented groups
- Evaluating data science training programs
- Culturally responsive evaluation
- None of the above

Please give a brief description of your general background, interests and research/work focus, as it relates to this conference. (400 characters max)

What do you hope to gain through your participation in the conference? (400 characters max)

Funding is available through the National Science Foundation to support travel and participant costs for most attendees. There will also be space available for those able to provide their own funding. What funding support would you like to receive if selected as a participant?

- Full support, including travel, lodging (includes breakfast), and conference registration (includes lunch)
- Partial support, including travel and conference registration (includes lunch)
- Partial support for conference registration only (includes lunch)
- I do not need funding support to attend

Appendix B: Conference Attendees

| <u>Name</u> | <u>Affiliation</u> |
|------------------------|--|
| Adrienne Smith | Cynosure Consulting |
| AJ Lauer | UCAR/Colorado |
| Alexis Racelis | University of Texas Rio Grande Valley |
| Alycia Crall | NEON/Battelle |
| Amir Akhter Kazi | City of Chicago Office of the Mayor |
| Annette Brickley | STEMming the Gaps Consulting |
| Aparna Bamzai | USGS North Central Climate Adaptation Science Center |
| Bonnie Swan | University of Central Florida |
| Bridget Miller | University of South Carolina |
| Carleisha Hanns | Conservation Fisheries Inc. |
| Carlos Castillo-Chavez | University of Arizona |
| Carolyn Finney | Unaffiliated |
| Carrie Diaz Eaton | Bates College |
| Cedric Chambers | Jump Recruits |
| Christian Hansen | Eastern Washington University |
| Christie Bahlai | Kent State University |
| Claire Lunch | NEON/Battelle |
| Clyde E Cristman | State Agency Head, Richmond, VA |
| Cynthia Phillips | NSF |
| Dalia Dorta | Environment for the Americas |
| Dana Gehring | Sinte Gleska University |
| Deanna Grimstead | The Ohio State University |
| Delanie Sickler | Boyce Thompson Institute |
| Dereka Carroll-Smith | Jackson State University |
| Diana Dalbotten | University of Minnesota |
| Diane White Husic | Moravian College |
| Drew Hasley | University of Wisconsin-Madison |
| Drew Lamar | William & Mary |
| Edem Yevo | University of Maryland/EcologyPlus |
| Elena Ortiz | Maricopa Community Colleges |
| Elliott Foust | UCAR/Colorado |
| Elizabeth Sudduth | Georgia Gwinnett College |
| Gary Silverstein | Westat |
| Gina Helfrich | NumFOCUS |
| Goldie Phillips | University of California, San Diego (Scripps) |
| Gregory Goins | North Carolina A&T State University |
| Guanyu Huang | Spelman College |
| Helen White | Haverford College |
| Henry Neal Williams | Florida A&M University |
| Holly Ewing | Bates College |
| Hong Qin | University of Tennessee-Chattanooga |
| Imelda Tice | Haines City International Baccalaureate East |

| | |
|--------------------------|---|
| Jackie Matthes | Wellesley College |
| James Rattling Leaf | Contractor |
| Janice Koch | Emerita Hofstra University |
| Jason Williams | Cold Spring Harbor Laboratory |
| Jeanette Clark | NCEAS |
| Jennifer Hanselman | Westfield State University |
| Jennifer Kakareka Balch | CU Boulder - Earth Lab |
| Jenny Palomino | CU Boulder - Earth Lab |
| Jesse Mostipak | Teaching Trust |
| Jon E Pederson | University of South Carolina |
| Joslynn Lee | Howard Hughes Medical Institute |
| Kaitlin Stack Whitney | Rochester Institute of Technology |
| Kalaivani Kubendran | Palo Alto Research Center |
| Kamuela Yong | University of Hawaii - West Oahu |
| Kari L. Jordan | The Carpentries |
| Katie Jones | NEON / Battelle |
| Kiley Friedrich | University of Minnesota Native Bee Lab |
| Kimberly Diep | Environmental Defense Fund |
| Kirsten Rowell | Global Sustainability Scholars/CU Boulder |
| Kristen O'Connell | Carleton College |
| Larry Hunter | University of Colorado-Denver |
| Lea Shanley | University of Wisconsin-Madison |
| Louis Gross | University of Tennessee, Knoxville |
| Lupita Montoya | CU Boulder |
| Lyla Crawford | DO-IT, University of Washington |
| Marco Hatch | Western Washington University |
| Maricela Avalos | University of Michigan |
| Matt Douglas | NSF |
| Megan Jones | NEON/Battelle |
| Melinda Laituri | Colorado State University |
| Melissa Watkinson | Washington Sea Grant |
| Melvin Hall | Northern Arizona University |
| Michael Koontz | University of California, Davis |
| Michael Trizna | Smithsonian Institution |
| Mickie Tang | Sierra Nevada Journeys; UC Santa Cruz Doris Duke Conservation Scholars Program |
| Mirian Tsuchiya | Smithsonian Institution |
| Molly Hetherington-Rauth | University of Toronto |
| Nicole Chodowski | Cornell University |
| Nievita Bueno Watts | Humboldt State University |
| Olivia Vasquez | Oberlin College |
| Pamela Bishop | University of Tennessee (NISER) |
| Rebecca Zulli Lowe | Cynosure Consulting |
| Sara Bolduc | Sara Bolduc Planning and Evaluation |
| Sara L. Young | Little Big Horn College |
| Sarah Stone | eScience Institute - University of Washington |

| | |
|----------------------|---|
| Sarah Supp | Denison University |
| Sharon Rivera | Tacoma Community College - Washington MESA Director |
| Sharon Ziegler-Chong | University of Hawaii at Hilo |
| SherAaron Hurt | Carpentries |
| Shobhana Gupta | NASA |
| Sudarshan Kurwadkar | California State University, Fullerton |
| Tania Schusler | Loyola University Chicago Institute of Environmental Sustainability |
| Terry Bilinski | St. Edward's University |
| Tina Ornduff | Google |
| Tracy Teal | The Carpentries |
| Travis Belote | The Wilderness Society |
| Urooj Raja | University of Colorado at Boulder |
| Virginia Do | UCAR, Boulder, CO |
| Virginia White | Riverside City College |
| Wendy Gram | motmot creative |
| Widodo Samyono | Jarvis Christian College |
| Yael Visser | City College of New York |

Appendix C: EDSIN Code of Conduct

This code of conduct outlines our expectations for participants within the EDSIN community, both online and at in-person events, as well as steps to reporting unacceptable behavior. We are committed to working to provide a welcoming, safe, and inspiring community for all and expect our code of conduct to be honored. Anyone who violates this code of conduct may be removed from the network. If you would like to make edits or suggestions for improving EDSIN's code of conduct, please visit the gDoc here [\[link\]](#).

Participation Guidelines

In following EDSIN's code of conduct, you should keep the following expectations about behavior in mind, which are essential for creating a welcoming and safe environment:

- Physical, sexual, and verbal harassment are unacceptable.
- Do not discriminate against people because of their identity (e.g. race, gender, sexuality, age, class background, ability, religion, and more).
- We expect participants to work together to create a welcoming, inclusive, and safe(r) environment for people from diverse backgrounds.
- Ask for consent (i.e. permission) and respect people's boundaries.
- Be considerate in your interactions with others and careful about the words you use. Is the language that you're using discriminatory?
- Be mindful of how much time and space you're taking up. Be aware of the dynamics of power and privilege, and whether you're taking advantage of it.

Anti-Harassment Policy: At Events & Online

We value your participation. We do not tolerate harassment of EDSIN community members in any form—online or at in-person events. Community members asked to stop any harassing behavior are expected to comply immediately.

Our Code of Conduct and Anti-Harassment Policy extend to all aspects of EDSIN where individuals' behavior affects the ability of others to participate. This includes online interactions (e.g. conference hashtag, interacting on conference-related platforms such as QUBESHub), as well as "after hours" at the conference, including evening social events. All conference and community participants, including sponsors, are subject to the anti-harassment policy.

If needed, conference and network hosts will provide information for participants to contact local law enforcement. Hosts will also make efforts to provide escorts or otherwise assist those experiencing harassment to feel safe, at the request of a participant. A full list of potential sanctions is provided below.

Harassment Definitions

For purposes of this code of conduct, sexual harassment is defined as unwelcome sexual advances, requests for sexual favors, or other verbal or physical conduct of a sexual nature when such conduct interferes with an individual's ability to participate in the EDSIN community or creates an intimidating, hostile, or offensive environment.

Other harassment is defined as verbal or physical conduct that denigrates or shows hostility or aversion toward an individual because of their race, color, religion, national origin, sex, age, sexual orientation,

gender identity or expression, personal appearance, political affiliation, marital status, family responsibilities, veteran status, matriculation, disability, mental illness, neuro(a)typicality, or any other legally protected status, and that creates an intimidating, hostile, or offensive environment for participation or unreasonably interferes with an individual's ability to participate in the community. We will not act on complaints regarding reverse-isms (e.g. reverse racism, reverse sexism), reasonable communication of boundaries (such as "leave me alone"), refusal to explain or debate topics, or criticism of 'tone' or oppressive behavior.

Reporting Issues

If you experience or witness behavior that violates the code of conduct at EDSIN's conference or online, please submit a report directly to EDSIN staff:

Alycia: acrall@battelleecology.org, (970) 227-3310

Megan: mjones01@battelleecology.org, (720) 921-2618

In your report, please do your best to include:

- Your contact information
- Identifying information of the participant who has violated the code of conduct
- The behavior that was in violation
- The approximate time of the behavior (if different than the time the report was made)
- Where the code of conduct violation happened
- The circumstances surrounding the incident
- Other people involved in or witness to the incident
- If you believe the incident is ongoing, please let us know
- Any additional helpful information

How We Respond to Reports

Actions in response to reports can range from warnings with instructions on how to correct behavior that violated the code of conduct to immediate removal from EDSIN events, online communities (e.g. email lists, community calls), and future engagement.

The following is a list of potential sanctions for anyone who violates the code of conduct, depending on the severity of the violation.

- Warning the accused to cease their behavior and that further reports may result in sanctions
- Ending a talk that violates the policy early
- Not publishing the video, slides of a talk, or poster that violated the policy
- Not allowing a speaker who violated the policy to give (further) talks at the event
- Immediately ending any responsibilities and privileges the accused holds
- Requiring that the accused immediately leave the event and not return
- Banning the accused from future events (either indefinitely or for a certain time period)
- Being banned or blocked on online community platforms, e.g. on our Community Discussion List, reported on Twitter, removed from online community groups (e.g. QUBESHub)
- Being reported to the proper authorities

Acknowledgement: This code was derived from the OpenCon's Code of Conduct [https://www.opencon2018.org/code_of_conduct].

Appendix D: Conference Registration Form

NSF INCLUDES Conference: Bringing Conversations on Diversity, Equity, and Inclusion in Data Science to the Environmental Sciences

We are excited to have you as a participant in the NSF INCLUDES Conference: *Bringing Conversations on Diversity, Equity, and Inclusion in Data Science to the Environmental Sciences*. Prior to your arrival, we would like to request some additional information and allow you the opportunity to submit an abstract if you are interested in presenting your work at the conference. Please submit your responses and abstract no later than March 1. If you have any questions, please contact [Alycia Crall](#).

Q3 Please enter your name and affiliation as you would like them to appear on your name tag. In addition, please enter your contact information to share with other attendees. If you do not want your contact information shared, please leave the appropriate spaces blank. Fields marked with * are required.

- Name* _____
- Affiliation* _____
- Email _____
- City _____
- State _____

Q4 Are you traveling with a personal care attendant (PCA) or personal assistant?

- Yes
- No

Display This Question:

If Are you traveling with a personal care attendant (PCA) or personal assistant? = Yes

Q5 For planning purposes, please provide your PCA's or PA's contact information:

- First Name: _____
- Last Name: _____
- Phone number: _____
- Email address: _____

Q6 Please indicate which room type you require from the following list.

- No lodging required
- Standard room

- ADA room with roll-in shower
- ADA room with tub and chair
- Room accessible for deaf/hard of hearing
- Other: please specify _____

Q7 Please note any dietary needs from the following list.

- No dietary needs
- Kosher meal
- Vegan
- Vegetarian
- Gluten free
- Other: please specify _____

Q8 Please select any additional accommodations you require from the list below.

- None
- Electronic copies of materials in advance
- Electronic text file of materials on-site
- Hard copies of materials on-site
- Materials in Braille
- Materials in font over 12 pt
- Wheelchair access
- American Sign Language
- Simultaneous spoken foreign language interpretation, please specify:

- Other: please specify _____

Q9 Please tell us any additional needs you may have for this meeting. Please be as specific as possible.

Q10 All conference attendees will have the opportunity to present information on their experiences, program(s), or research as it relates to the conference theme. Please indicate your preference below, noting that there is limited space for lightning talks.

- Poster presentation with opportunity to share digitally
- 5-minute lightning talk that will be live-streamed and recorded for remote viewing
- I am a keynote or plenary presenter (by invite only)
- I do not wish to present

Display This Question:

If All conference attendees will have the opportunity to present information on their experiences, p... = 5-minute lightning talk that will be live-streamed and recorded for remote viewing

Or All conference attendees will have the opportunity to present information on their experiences, p... = Poster presentation with opportunity to share digitally

Q11 Please provide the following information for your presentation.

- Title of presentation _____
- Authors _____

Display This Question:

If All conference attendees will have the opportunity to present information on their experiences, p... = 5-minute lightning talk that will be live-streamed and recorded for remote viewing

Or All conference attendees will have the opportunity to present information on their experiences, p... = Poster presentation with opportunity to share digitally

Q12 Please provide an abstract for your presentation (1500 character maximum).

Q13 A majority of the conference time will be used for breakout discussion sessions relevant to the conference theme. Please list up to five topics that you would like to see included in these sessions.

- Topic 1 _____
- Topic 2 _____
- Topic 3 _____
- Topic 4 _____
- Topic 5 _____

Q14 We will have tables available to share materials from the diversity of groups and organizations represented at the conference. Would your group/organization like to contribute materials?

- Yes
- No

Display This Question:

If We will have tables available to share materials from the diversity of groups and organizations r...
= Yes

Q15 Please provide us with the name of the organization and contact information for who will be providing the materials.

- Name of Organization _____
- Contact Name _____
- Contact Email _____

Q16 Please provide any additional comments.

Appendix E: Presentation Titles and Abstracts

KeyNote Presentations

At the Crossroads: Black Faces, White Spaces & Re-thinking Green

Presenter: Carolyn Finney, Independent Scholar

Abstract not provided.

Spatial Justice, Marginal Populations, and Data Integrity

Presenter: Melinda Laituri, Colorado State University

Spatial justice refers to the consequential geography of a place where spaces are socially produced. Our increasing dependence on digital data to represent space demands that we adopt practices that reflect how best to capture place. Places reflect where people live; the amenities and emotions associated with living there. However, mapping space through digital technologies often does not reflect the social connections to places. Who lives where and why? Who has access to resources and services and who does not? How are healthy environments measured? Understanding how spatial injustice is created at different spatial scales is an essential part of participatory practices to collect community data. Giving voice and visualization to marginal populations are part of mapping efforts to assess the spatial arrangement of space where communities are integrated and included in such projects. This is a fraught enterprise due to the digital divide, technological challenges and the need to ensure ethical practices in data collection and data integrity.

Integration of Traditional Ecological Knowledge with Big Data and the Recruitment and Retention of Indigenous Students

Presenter: Marco Hatch, Western Washington University

One common barrier to STEM engagement in underserved and underrepresented communities is a feeling of disconnection from mainstream science. This attitude is rooted in a history of researchers and decision-makers collecting, analyzing and interpreting data without engaging community members as true partners and equals. Spanning this boundary between ecological research and communities impacted by environmental change is foundational to moving toward a more equitable future focused on solutions that serve under-resourced communities facing the brunt of environmental degradation and climate change. Great strides have been made toward the goals of democratizing conservation science, empowering local communities to engage with mainstream research on a level playing field. However, these initiatives are subject to a few common pitfalls such as, projects that do not fully account for the social-cultural context of the community, projects that fail to understand the foundationally different worldview of Indigenous communities. These pitfalls can lead to partnerships with the unstated goal of “making them like us”, where the actions of the partnership are structured such that the decision-making power and authority is retained within the STEM disciplines, and if community members want access to that authority, they must conform their worldview to mainstream science. We believe that spanning this boundary between local communities and mainstream science will increase social justice, increase the relevance of conservation science, and open new opportunity spaces for all involved. Central to the success of this vision are boundary spanners.

In Pursuit of Inclusive Excellence in the Environmental Sciences

Presenter, Melvin Hall, Northern Arizona University

Abstract not provided.

Actually, Data Science CAN Be Accessible: Barriers to inclusion of people with disabilities in the data science workforce pipeline and ideas for lowering them

Presenter: Drew Hasley

If you were designing a course or employee training that introduces participants to writing and executing code, statistical analyses, and data visualization, what would you do to make it inclusive of participants with disabilities? What sorts of accessibility issues might you anticipate? How might you address them before you even know who the participants are? Why shouldn't you just wait until you have a participant with a disability and work with them directly to make accommodations? Confidently answering such questions can be daunting. It requires knowing what disability is, awareness of some barriers to participation in data science by people with disabilities, some knowledge of tools and strategies for lowering those barriers, and above all, creativity. In this talk, I will address each of these, drawing on personal experience as a student and professional with a severe visual impairment, and knowledge gained from colleagues and friends during ongoing efforts in the area of accessible teaching in quantitative biology. Audience members will leave this talk with a better understanding of barriers to recruitment and training of people with disabilities in data science and some tools and strategies to lower them. They will also learn about areas requiring more attention. My primary goal is to leave audience members with the confidence that they can indeed help address the substantial underrepresentation of people with disabilities in this vital, growing field.

Understanding the Dynamics of Socio-Epidemiological Systems: Tipping Points and Models of Contagion

Presenter: Carlos Castillo-Chavez, Arizona State University

The spread of fads, scientific ideas and the growth and stability of communities can also be understood as contagions. In this talk, I would focus on contagion in all its glory, including its role on building communities of mentors and understanding the role that initial conditions should play in our definition of meritocracy.

Lightning Presentations

Broadening Participation with Bioinformatics, Big Data, and Data Science

Jason Williams, Cold Spring Harbor Laboratory

This talk highlights challenges and opportunities surrounding bioinformatics training and aims to spark conversation reshaping the training landscape. As new methods such as machine learning/deep learning become more relevant to biology, we risk widening the intelligibility gap between the training “haves” and “have-nots.” The community has a need for extensive discussion on this topic and support for development of alternatives to classroom training that can bridge gaps between the large numbers of existing researchers who need to understand and apply data science skills, but who are unlikely to return to formal schooling. Findings by NIBLSE (pronounced “nibbles”) – Network for Integrating

Bioinformatics in Life Sciences Education – revealed that 95% of faculty believe bioinformatics should be taught, but only 40% manage to do so (with clear disparities for faculty at less-resourced institutions). Input from the survey and a NIBLSE working group has also generated a set of bioinformatics competencies for undergraduate bioinformatics (Sayers et.al. 2018). A survey of NSF-funded investigators in the biological sciences (Barone et.al. 2017) conclude that training in several areas of bioinformatics are the most unmet need for established researchers. Improving the bioinformatics curriculum opens up opportunities for broadened participation by equipping students and teachers with the skills needed for 21st century careers in STEM. Examples of CyVerse and Cold Spring Harbor DNA Learning Center programs that integrate bioinformatics, big data, and data science will illustrate effective ways to engage diverse students with in-demand skills.

Expanding the pipeline: Engaging urban secondary school and college students in science and the environment

Yael Wyner, City College of New York, City University of New York and Janice Koch, American University

This speed talk will describe three education projects that engage urban minority students in science and the environment. Two projects focus on secondary school ecology and evolutionary biology learning in New York City science classrooms. The third project is a new science learning and public engagement major for City College of New York undergraduate students. Each of these projects seeks to increase access to science learning and science careers. With NSF funding, we created curricular resources grounded in published scientific data to connect the daily lives of New York City high school students to ecological concepts learned in school. We also created curricular resources for New York City middle school students to help them notice the evolutionary patterns of the sidewalk trees they pass daily. We are currently designing a new undergraduate program to prepare City College graduates to deliver STEM learning at botanical gardens, museums, zoos, environmental education centers, community-based organizations, educational, and science and environmental non-profits. The new City College program is a response to the unmet need to expand the science engagement pipeline to members of underrepresented groups.

Using spatial data and GIS for remote internships through the EcologyPlus program

Travis Belote, The Wilderness Society, Edem Yevo, University of Maryland, and Teresa Mourad, Ecological Society of America

The EcologyPlus program recruits and supports a cohort of diverse students to pursue a variety of professional development opportunities through a diverse network of organizations. The Wilderness Society, as a partner organization, hosted three EcologyPlus student interns in the fall of 2018. The internship began with a week-long trip to Montana to visit Yellowstone National Park, meet local scientists, receive a short-course on geographic information systems (GIS) and spatial data, and develop research questions. Each student developed separate but related questions requiring various spatial datasets, data management, and analytical approaches. The students completed most of the work at their home institutions throughout the fall semester of 2018. The remote internship included biweekly check-ins including “shadowing” via screenshares to work through data analysis challenges. Students presented their work during a one-hour presentation and webinar at the end of the semester. We will discuss the value of spatial data and GIS in undergraduate education and provide recommendation for a successful remote internship. Our key recommendations include spending time

together in-person for a kick-off event, regular check-in meetings with video conferencing and screenshares, and developing clear deliverables (report or professional presentation) to bookend the experience.

Impact of Urban Development in DC

Edem Yevoo, University of Maryland and Travis Belote, The Wilderness Society

As the global population continues to increase, more people are moving from rural to urban areas. In the next decades, most of the world's population will be living in urban areas. Utilizing geospatial data from the United States Geological Survey (USGS), a predictive visual model was created using geographic information systems (GIS) software. The model was used to predict the change in the District of Columbia's (DC) urban landscape over time. The use of GIS and data analysis systems hold the key to tackling current and future environmental issues. I will discuss the use of spatial data and how it can be used to impact policy, climate change, and socioeconomic conditions in our urban environments.

What is Big Data For?

Jennifer Balch, Earth Lab/University of Colorado-Boulder and Kirsten Rowell, University of Colorado-Boulder

What are we actually harnessing the data revolution for? It's for humanity. Ultimately, big data should help improve people's lives and help society live more sustainably with our planet. It's not anyone's data, it's everyone's data. This makes it critical to involve, encourage, and support a diversity of people in owning the data and ultimately owning the solutions that come from that data.

Data science teaching alternatives from The Carpentries

Tracy Teal, Kari L. Jordan and SherAaron Hurt, The Carpentries

Training for data skills is more critical now than ever before. In the past decade, we've seen the creation of certification and graduate programs for data science, as well as a plethora of interactive, self-paced online learning platforms. Today's learners are often learning on the job and need the flexibility of short, or self-paced learning experiences. Research results, however, stress the importance of guided instruction and learner-instructor interaction. We've taken a distinctive approach to this problem, combining the power of guided instruction with the flexibility of short, focused learning experiences. Two-day, interactive, hands-on coding workshops train researchers to work with data, and have impacted over 27,500 researchers, ranging from biologists to physicists to engineers and economists. Researchers have benefited from evidence-based teaching approaches to learning data organization (spreadsheets), cleaning (OpenRefine), management (SQL), analysis and visualization (R and Python). This talk focuses on implications and growth opportunities for incorporating data science curriculum at the university level, from the perspective of The Carpentries. We explore tips and best-practices in data science curriculum development including assessment strategies, accessibility, and equity and inclusion.

Building a diverse undergraduate community of learners in data science and biology

Sarah R. Supp, Denison University

This talk will use two examples to discuss inclusive pedagogical strategies for training in data science skills. Building a new interdisciplinary program for undergraduates in data analytics, we have a project-based pedagogy, and as a unit have considered ways in which we can spark interest and build academic successes for students more broadly, including students that are traditionally underrepresented in the Computer Sciences, or other related technical fields. This talk will also discuss an ongoing project to address gaps in training for undergraduate instructors, to enhance data education in biology curriculum, thus also broadening access to technical skills for students in these courses.

Centering Historically Underrepresented Voices in the Salish Sea

Melissa Watkinson, Salish Sea DEI Community of Practice

Addressing inequity and working toward environmental justice is essential to a successful environmental movement. Currently, there are significant disparities in the representation, content, and processes for implementing diversity, equity, and inclusion (DEI) within the environmental field across the Salish Sea and the Pacific Northwest Coast. Although professionals in this field are aware and concerned about issues related to DEI, there is an overall lack of understanding for how to integrate these concepts into the environmental workforce. Addressing inequity and working toward environmental justice is essential to a successful environmental movement. We believe that by creating and fostering a Salish Sea DEI Community of Practice (CoP), we can begin to build this critical foundation together.

UW Data Science for Social Good

Sarah Stone, University of Washington and Anissa Tanweer, University of Washington

Launched in Summer 2015, the UW Data Science for Social Good (DSSG) program partners eScience Data Scientists and Student Fellows from across the country with Project Leads from academia, government, and the private sector to find data-driven solutions to pressing societal challenges. Previous projects (15 over the past 4 summers) have involved data analysis and visualization on topics such as transportation, public health, sustainable urban planning, homelessness, and disaster response. Several projects have led to long-term collaborations and funding opportunities. Integrated project-based discussions and training around data science ethics, human-centered design and stakeholder collaboration are keystones of our DSSG program. Differences in prior experience and training among student fellows can pose a challenge, but often become a strength in the context of project work. Our experience running this program supports the notion that DSSG programs can both effectively impact social good and provide "real world" data science training for students from diverse disciplinary backgrounds.

Asset Mapping: A Simple Tool for Recruiting and Retaining Underrepresented Populations in STEM

Adrienne Smith, Cynosure Consulting and Rebecca Zulli Lowe, Cynosure Consulting

Asset maps serve as a simple, yet impactful tool for helping underrepresented groups connect with important people, programs, and resources that would support their recruitment and retention in STEM. In contrast to a traditional deficit-focused mindset, asset mapping was born out of an approach that seeks out existing strengths and works to build capacity by leveraging current resources as a foundation for further innovation. At the end of this talk, individuals will walk away with a list of steps

that they can use to develop a comprehensive map that could be distributed immediately to current and future STEM (including high school seniors). These steps include identifying current assets within an array of existing categories (e.g., tutoring centers, individual faculty mentors, local chapters of STEM associations) designed to help mappers think expansively about existing supports. Additional steps involve reviewing contact lists and asking others to assist in the identification of assets, performing internet searches of the school/organization website looking for key words, and reading through the university directory to highlight offices that work on diversity issues or support the individuals targeted. The assets can be plotted directly onto a campus map and supplied to underrepresented groups, so they are aware of and can locate the resources and supports available to them. Additionally, the formation of the maps can be a beneficial exercise for departments to use to assess their own assets and strategically plan for the development of new assets.

Possibility or Pitfall: Looking at Emerging Tech and Inaccessibility

Urooj Raja, University of Colorado-Boulder

This presentation was not live streamed or recorded.

Emerging technologies are proliferating at a rapid pace. Scholars use the broad term emerging technologies as a catchall phrase to describe those technologies that show massive innovative potential, can be rapidly absorbed into the market place, and have the power to disrupt the status quo. Artificial intelligence, nanotechnology, robotics, and virtual reality are all examples of emerging technology. A byproduct of emerging technologies is emerging inequality, for example, advances in automation will cut down the need for blue collar workers, whereas educational advances in artificial intelligence will help the most affluent school districts that have the ability to pay for the expensive tech retain the technology. It also remains that despite the pervasive use of emerging tech, scholars have been slow to investigate the social implications of these technologies. For example, little research considers the racial, gender, institutional and class disparity effects of emerging technology. Of the handful of studies that do consider these effects, many researchers study these impacts in isolation, and subsequently do not understand the intersecting nature of these disparities. Nonetheless, it remains that emerging technology is going to exert a momentous impact on how society is and will be shaped in the years to come. In this backdrop, it is essential that scholars discuss new ideas on how we can study the resultant inequity impacts of emerging tech on society. The ultimate goal of this presentation is to provide a snapshot of these new directions to the study of emerging tech and inequality, and perhaps more ambitiously to discuss how we can bring this issue to the consciousness of others. Questions to consider: How do we consider the benefits and potential pitfalls of emergent tech across disciplines and methodologies? What roles and responsibilities do scholars have in studying emerging tech? How does emerging tech magnify the already preexisting biases in our society? Is emerging tech making our society more or less unequal, what are the implications of such an occurrence?

Storytelling: a restorative practice and identity building tool for youth

Kirsten Rowell, University of Colorado-Boulder and Carolyn Finney, Independent Scholar

This presentation was not live streamed or recorded.

The stories of environmental stewardship that have been historically championed in the U.S. have been woefully exclusive and homogenous - not very representative of national demographics. The impact and efficacy of environmental work is severely limited when communities don't see themselves in

language, curriculum, and media related to environmental work. Recruiting, retaining and enabling future professionals from across the many communities that represent the U.S. will require multiple approaches and restorative work within the environmental field, curriculum, and programming. We use storytelling as a tool for building identity within the field, a restorative and empowering practice, and even a learning tool for those stuck in normative culture. Through this process, a new generation of environmental professionals form their own authentic connections to the environment, built the intercultural trust necessary to talk across differences, and challenged our understanding of the boundaries in the field of conservation.

Make student thought process visible using video recording

Hong Qin, University of Tennessee at Chattanooga

The author will present his experience of integrate screen-recording to enhance student learning experience of computational biology. Students were required to screen-recording their process of solving computational problems. These screen-recordings can be used to identify the learning hurdles of students and improve student learning experiences.

Summary of the National Academies Report on Data Science for Undergraduates

Louis Gross, University of Tennessee

Under the auspices of the National Academies, a Committee developed a consensus report regarding means to enhance undergraduate programs in the emerging discipline of data science. Building upon advice from a variety of on-line and in-person interactions with a broad spectrum of experts, the report provides a collection of findings and recommendations for initiating, developing and evaluating programs that prepare students for careers in data science as well as encouraging methods for all undergraduates to be exposed to basic concepts in this field. I will summarize the suggestions made regarding development of data acumen, incorporation of real-world examples, enhancing teamwork and communication, ethical considerations, and assessment and evaluation of data science programs. I will emphasize the potential for such programs to broaden participation in quantitative science and the benefit of utilizing environmental data and examples that align with the interests of diverse students.

Diversity, Inclusion, and Data Science at the National Ecological Observatory Network

Megan Jones, Battelle/NEON

NEON, the National Ecological Observatory Network, is an NSF-funded large science facility, operated by Battelle, is designed to collect extensive ecological and environmental data from across the U.S. for the next 30 years. A primary product of NEON is freely available, open access data for use by the scientific research community as well as by students and others who will explore the petabytes of information that will be available during the lifetime of the Observatory. Using NEON data, however, may not be an easy task for researchers, faculty, and students who are not familiar with “big data” access, management and analytic methods. Many ecologists are transitioning to using data science and big data methods including programming-based data management and analysis, complex data portals and APIs that provide access to lots of different types of data, and diverse analytical methods beyond those classically used in their individual research area. Furthermore, ecological data is usually messy in the sense that variability and uncertainty are important components of data analysis and interpretation. Given these challenges, how do we accelerate the use of big data in ecological research

and education? How do we create equitable opportunities for data and resource access to all interested individuals? How do we engage communities that have not traditionally been drawn to careers in ecology but for which data science focused careers may provide new opportunities?

NSF INCLUDES Coordination Hub

Gary Silverstein, Westat and Coordination Hub Team

Abstract not provided.

Poster Presentations

Making Scientific Content Accessible

Kaitlin Stack Whitney; Simon J Goring; Aerin Jacob, Emilio Bruna, and Timothee Poisot

Effective communication is critical to scientific practice. So much so that that helping scientists improve their communication skills has been a significant focus of energy for organizations ranging from academic societies to graduate training programs. The need for effective communication could also be viewed as central to "Open Science," and making research products (e.g., data, code, scientific literature) more broadly readily available. Despite this, however, surprisingly little attention has been paid to ensuring that presentations are accessible to all. Improving accessibility requires some foresight, planning, and preparation on the part of the presenter: accessibility-centered thinking. Yet fear that accessibility requires expensive or complicated tools and workflows may prevent people from trying - so here we provide evidence-based, simple but concrete steps for creating and sharing science for all.

National Institute for STEM Evaluation and Research

Pam Bishop

The National Institute for STEM Evaluation and Research (NISER) provides quality evaluation services to the Science, Technology, Engineering and Mathematics (STEM) research and education sectors, with an emphasis on diversity, equity, and inclusion. NISER was founded in 2016 under the leadership of Dr. Pamela Bishop and is part of the National Institute for Mathematical and Biological Synthesis (NIMBioS), housed at the University of Tennessee, Knoxville. NISER's staff has experience in systems-level evaluation, a deep understanding of interdisciplinary team science, a professional collaborative approach to program evaluation and research, and the ability to untangle the complexity of large-scale STEM programs. We offer a range of data-driven services to best serve our collaborators' needs.

The Implementation of Differentiated Instruction to Introduction to Statistics, Data Mining, and Analytics at Jarvis Christian College

Widodo Samyono

The primary goal of Jarvis Christian College (JCC) two years project with the title, "The Implementation of Differentiated Instruction to Introduction to Statistics, Data Mining, and Analytics at Jarvis Christian College," is to meet the needs of students with diverse abilities and interests, so that the faculty could improve the engagement with the students, enhance the students' skills (abilities) and interests in mathematics, and increase the number of the students who passed the course with 80% passing

grades. Differences in Introduction to Statistics, Data Mining, and Analytics at Jarvis Christian College are cognitive, learning styles and preferences, and abilities and interests. The differentiated instruction is a method of instruction designed to meet the needs of all students by changing what students learn (content), how they accumulate information (process), how they demonstrate knowledge or skills (product), and with whom and where learning happens (learning environment). Furthermore, it's a way of thinking about teaching and learning to ensure that children receive appropriate classroom experiences according to the differentiated instruction expert Carol Tomlinson. We build our differentiated instruction for this course by converging different student centered active learning into a blended course as follows: 1) Setting up the course as a blended or hybrid course, i.e. 75% is face to face instruction and 25% is online instruction. So, the classroom attendance is required and a part of the grade. Additionally, the students have one on one help sessions with the instructors and the teaching assistants in the classrooms and with the instructors during the office hours as well as with the teaching assistants in the Student Success Services Building. 2) Before coming to the classroom, the students should work on the flipped online assignments, i.e. reading the textbook and watching the video lectures related to the coming topics that will discuss in the classroom. 3) In the classroom, using inquiry based learning the faculty discussed the topics covered for that day for the entire class, then the faculty with teaching assistant have the one on one help session with the students for any problems in the homework assignments and assessments. 4) After the class, the students continue completing the assignments on the online automatic grading homework software. The students work in the groups or individually. For the high achievers, they could move ahead to the next assignments and finish earlier than the other students. For the lower achievers, they could go to the help sessions with the faculty or teaching assistants. 5) At the end of the semester, the students have to submit projects on the applications of statistics, data mining, and analytics in their majors.

Environmental Dashboard: Interactive Technology for Resource-Use Feedback and Community Engagement

Olivia Vasquez, John Petersen, and Rowan Hannan

"Environmental Dashboard" (ED) is an interactive communication technology that introduces feedback into our industrialized society, where we are so far removed from naturally occurring feedback loops. Our goal is to promote systems thinking and foster pro-environmental and pro-community action. Through the Dashboard's several core components, we provide real-time information on resource-use and highlight the thoughts and actions of community members. The ED content is available on the web and digital signage that show a virtual town model with animated characters and real-time flows of water, energy, and environmental conditions. The "Community Voices" component features images and text derived from community discussions, interviews, public documents, and schools to celebrate positive thought and action. The Environmental Dashboard has been implemented in the City of Oberlin, Ohio for over a decade and components are now installed in buildings and communities across the country. Extensive research suggests that the technology is effective at building awareness, shifting social norms, enhancing emotional connection to resource use, and promoting behavior change.

Training and Engaging URM Undergraduate Students in Genomics Research Through a Place-based Microbiome Research Project

Joslynn Lee

The participation of American Indian/Alaskan Native (AIAN) people and other underrepresented minority (URM) populations in STEM fields remains shockingly low. In the computational field, it is even lower. AIAN face various barriers that impede them from pursuing or continuing careers in genomics. Alongside, there is a demand for Integrating bioinformatics and data science into the life sciences curriculum. I am presenting a one-week workshop training format that allows students to gain hands-on laboratory and computational experience to understand the diversity of local environmental microbiomes in Colorado and New Mexico. This workshop targets early-career undergraduate students from Southwest regional PUIs, two-year and tribal colleges. Aligning cultural sensitivities that may arise with sampling and working with biological samples with Indigenous / AIAN cultures. Core competencies incorporated in the workshop are computational concepts (algorithms and file formats), statistics, accessing genomic data and running bioinformatics tools to analyze data. I will discuss some of the successes and pitfalls that I have encountered and the adaption for a one-semester course.

West Big Data Innovation Hub

Sarah Stone

The West Big Data Innovation Hub builds and strengthen strategic partnerships across academia, industry, nonprofits, and government--harnessing the data revolution to address scientific and societal challenges. Whether working towards the future of data-informed policies to ensure safe drinking water or tackling challenges in disaster recovery, our diverse and growing team of stakeholders envisions a community empowered to contribute to a thriving regional, national, and global innovation ecosystem. The Hubs provide a creative and inclusive "home", an affiliation that sparks meaningful connections and enables valuable work to positively impact science and society. We focus on data science activities and initiatives that inspire cross-sector collaboration and exemplify the need for multi-disciplinary approaches. The Hub creates an open community with an array of engagement opportunities where all are welcome, encouraging participation from underrepresented groups, organizations, and geographic regions. The project broadens participation across traditional boundaries between disciplines, sectors, institutions, and demographic groups, focusing on critical challenges, open source tools, and collaborative insights.

Students of Color Identify Ways Environmental Faculty Can Advance Racial/Ethnic Diversity in Undergraduate Programs

Melissa Hernández, Bala Chaudhary, Malcom Engel, Charles Espedido, Amelia Howerton, Jazlyn Marcos, Brittany Rivera, and Tania Schusler

Racial and ethnic diversity in environmental disciplines lags far behind the 38% people of color (POC) population in the U.S., despite research documenting high levels of environmental concern among POC. Addressing this inequity is essential to advance environmental justice. Identity diversity also lends itself to cognitive diversity, which promotes creativity and innovation in solving environmental problems. Environmental degree programs serve as a pipeline to environmental careers. Thus, we investigated the experiences of students of color in undergraduate environmental degree programs using grounded theory methodology. We interviewed 24 undergraduates at two private universities in Chicago who self-identify as racial or ethnic minorities and have declared an environmental major. Interviews examined motivations for entering environmental fields, perceived barriers and supports to academic success, and suggestions to improve racial and ethnic inclusion within environmental degree programs. We inductively analyzed data across interviews via an iterative process of coding,

categorizing, and memo-writing to identify emergent themes. The results deepen understanding of how environmental programs in higher education can become more inclusive, thereby strengthening the pipeline to environmental careers for POC and increasing racial and ethnic diversity in the field towards more innovative and just environmental solutions. The students we interviewed spoke of prior educational experiences, influential individuals, and prior experiences in their communities as factors influencing them to study the environment. Many described a concern for social well-being in tandem with ecological well-being as a key motivator to pursue an environmental major. Yet, some students felt that the curriculum in their program did not sufficiently integrate ecological and social perspectives. They perceived that social implications of science learning were understudied and that environmental solutions presented in classes often reflected a "white environmentalism" incompatible for many POC. This, as well as a lack of awareness or unwillingness of instructors and white peers to discuss the experiences of different social groups and the role of identity within social-ecological systems, left some students feeling excluded. As a POC in a majority white setting, some students also felt isolated due to a disconnect between their own backgrounds and those of peers and instructors. Others experienced discrimination, such as micro-aggressions or tokenism, that furthered this sense of isolation. On the other hand, some students described how support networks enhanced their program satisfaction. Faculty and staff played key roles in guiding students of color to enter and succeed in the environmental major. Some faculty validated racial and ethnic inequities in the context of course content, enabling students of color to feel comfortable sharing their own perspectives. Students, membership in organizations, some within the environmental degree program and others external to it, allowed them to connect and form bonds with other POC as well as white peers. These organizations also provided opportunities for students of color to engage more deeply with the environmental subjects of greatest interest to them. The students interviewed recommended four key ways to cultivate racial and ethnic diversity within environmental degree programs: (1) Intentionally recruit students of color. (2) Hire diverse faculty and staff, and provide diversity training for all faculty and staff. (3) Include the perspectives, literature, socio-ecological problems, and approaches of POC into the curriculum. (4) Create resources specifically for, and accessible to, students of color for finding support and engaging with environmental topics of interest.

The Research Experience for Undergraduates on Sustainable Land and Water Resources

Diana Dalbotten, Antony Berthelote, and Nievita Bueno Watts

The aim of the REU on Sustainable Land and Water Resources is to introduce undergraduate students to the key elements of research on land and water resources that are essential to improving management practices, with a focus on Community-Based Participatory Research (CBPR) and diverse interdisciplinary research teams. Students work on teams on projects that integrate Earth-surface dynamics, geology, hydrology and other disciplines. Research teams are hosted on two Native American reservations and at the Univ. MN and projects are developed in collaboration with the tribes' resource management divisions. The REU incorporates an interdisciplinary team-oriented approach that emphasizes quantitative and predictive methods, CBPR, indigenous research methods, and traditional ecological knowledge. The REU Site is developing a new paradigm for undergraduate research incorporating place-based and community-based participatory research. The PIs are building knowledge on increasing participation in REUs by the non-traditional student and students from groups underrepresented in STEM. The PIs have developed a proven, structured, scaffolded method of teaching science research and writing, which takes students who may have never written a technical

research paper and provides them the skills and support needed to routinely deliver an astonishing level of vigorous intellectual output and increase their intellectual self-confidence in the process.

Pathways to Careers in Natural Resources

Susan Bonfield and Dalia Dorta

Environment for the Americas (EFTA) has conducted model minority youth internship programs to recruit youth of color and to provide them the opportunity to work side by side with professionals from governmental and non-governmental organizations, including Los Angeles Audubon, US Fish and Wildlife Service, Bureau of Land Management, National Park Service, and US Forest Service. Our experience working with underserved youth is informed by four years of NSF-funded research on how to improve the participation by diverse people in informal science education programs. Today, we work with over 50 youth each year and provide mentorship and support not only during their internships, but also after, supporting them as they seek jobs and/or graduate school admissions. EFTA shares its expertise and participates in efforts nationally and internationally by serving on the Board of the Diversity Joint Venture and on the Society for Conservation Biology's Anti-Sexual Harassment/Violence Taskforce.

Geospatial Data Science at the Southwestern Indian Polytechnic Institute: Status, Plans and Opportunities

Dennis G. Dye

The Southwestern Indian Polytechnic Institute (SIPI) is an Albuquerque, New Mexico-based national community college that serves the higher education needs of Native American Tribes and Alaska Native communities throughout the country. Several of SIPI's academic programs, including Geospatial Information Technology (GIT), Pre-Engineering and Mathematics, expose students to various aspects of Data Science, however coordination of their respective curricula has been limited. This presentation describes emerging opportunities at SIPI to establish an interdisciplinary program in Data Science that provides a framework for coordination and synergy, and in turn, enhances SIPI students' success in 4-year baccalaureate programs, and improves their competitiveness for quality STEM-related jobs. Particular attention is given to possibilities to incorporate into the GIT Program a new area of emphasis on "Distributed Sensor Systems and Wireless Sensor Networks for Monitoring of Water Resources, Ecosystems and Climate", and its role in the potential Data Science program.

Expanding access to data intensive education in earth and environmental sciences

Jenny Palomino, Leah Wasser, and Lauren Herwehe

The Earth Lab Earth Analytics Education Initiative at the University of Colorado -- Boulder is building an innovative program that provides core in-market demand technical skills at the intersection of Earth and data science to undergraduate, graduate and professional students. The program includes formal courses, workshops, career development events with industry partners, paid undergraduate internships, an open online learning portal with global reach, and a professional certificate in Earth data analytics, one of the first of its kind in the country. We are committed to expanding the reach of Earth data science education for students across varying academic, professional, socio-economic and geographic dimensions to ensure broad accessibility to novel curriculum. All courses support a blended mix of students with varied academic and professional experiences, resulting in interdisciplinary and

multi-level classrooms that enrich students' learning through collaborative and peer feedback activities that introduce new ideas and ways of thinking. To accommodate diverse student needs and increase program access, courses are offered through both online and traditional options, allowing students to participate in-person, online in real-time, or asynchronously by reviewing materials at their own pace. This flexibility supports the inclusion of students with full-time employment or other commitments that challenge enrollment in traditional courses as well as remote students living in other parts of the country or globe, who may not have access to similar curriculum locally. Our curriculum is informed by industry surveys to ensure that students are learning sought after skills at the intersection of earth and data science. All lessons use open source tools to teach students how to work with real-world data to address questions and challenges for earth and environmental systems. We comprehensively evaluate our courses using formative, summative, and longitudinal approaches (including student surveys, grades, and website metrics) to ensure that learning goals are being met and that all students are satisfied with the blended learning environment. To support Universal education, all course materials are carefully designed to support asynchronous online and independent learning. Materials are search engine optimized to ensure greater visibility and then published online on the earthdatascience.org website, which has a rapidly growing user base of more than 41,000 unique global monthly users. Our blended, open education model opens access for students world-wide, who may otherwise not have access to this curriculum, to develop key skills for careers in earth and environmental data science at their own pace.

QUBES: A community of practitioners working together to improve quantitative biology education

C. Diaz Eaton, M.D. LaMar, and N. Chodlowski

QUBES is a community of practitioners, institutions, researchers, networks, and professional societies all devoted to supporting instructors around the country for an increasingly quantitative biology field. We provide faculty mentoring networks for virtual professional support, connect faculty to high quality curriculum, and host a virtual infrastructure for open educational resource sharing and software use. All our welcome to join for free at qubeshub.org!

An Integrated Quantitative-Qualitative Study to Assess the Reliability and Monitor the Performance of Hydrogen Fueling Stations

Kalai Ramea

Alternative fueled vehicle adoption is one of the critical solutions to mitigate carbon emissions in the transportation sector. Even though electric vehicles (EV) have been leading the market adoption among zero-emission vehicles, hydrogen fuel cell vehicles (FCV) have also been increasingly adopted in the past few years. FCVs have several advantages over EVs, such as shorter refueling time and higher driving range, but unlike electric vehicles which could be charged at home or work, they require sufficient and reliable network of hydrogen refueling stations. This research project carries out an integrated quantitative-qualitative study to assess the reliability and performance of hydrogen fueling station network in California. For the quantitative analysis, we collected the hourly capacity data of all the hydrogen fueling stations for three months. This time-series data was used to develop a novel term called "Normalized Relative Usage Index" (NRUI) that encapsulates the usage of each station over time in the network. We spatially regressed this value over the number of fuel cell vehicles present in the neighborhood to identify the stations that are in the "healthy usage range" and those that are under-

utilized or over-stressed. We also designed a survey to obtain the experiences of FCV drivers on the station performance. About 100 participants took the survey, and their answers predominantly validate the quantitative analysis. Moreover, the respondents articulated their reasons for the stations that are outside of the healthy usage range as well as their expectations for a station to be considered reliable. This comprehensive study is first of its kind to explore spatially explicit supply and demand of the hydrogen fueling infrastructure network. Even though the research paper focuses its analysis on the hydrogen refueling stations in California for a specific period, this data-driven methodology is region and timescale-independent and could be extended for larger timescales to monitor the station performance as perceived by the users. We are also releasing the hourly station capacity dataset that was collected as a part of this study to the research community.

Mentoring Pacific Island Students into Conservation Careers

Sharon Ziegler-Chong

No abstract provided.

Appendix F: Organizations Sharing Information

AccessCyberlearning, DO-IT, University of Washington
Citizen Science Association
Coastal Almanac
Cynosure Consulting
CyVerse
Earth Lab, CU Boulder
Ecological Society of America
Environment for the Americas
eScience Institute - University of Washington
Geoscience Alliance
Global Sustainability Scholars
Jarvis Christian College
Jump Recruits
National Institute for STEM Evaluation and Research
NEON
NIMBioS - University of Tennessee
Plant Science Research Network
QUBES
Research on Women and Education Special Interest Group AERA
Science Education Resource Center
Southwestern Indian Polytechnic Institute
The Carpentries
University of South Carolina College of Education
University of Tennessee at Chattanooga
Westfield State University

Appendix G: Post Conference Evaluation

NSF INCLUDES Conference: Bringing Conversations on Diversity, Equity, and Inclusion in Data Science to the Environmental Sciences

Thanks for joining us as a participant in the NSF INCLUDES Conference, *Bringing Conversations on Diversity, Equity, and Inclusion in Data Science to the Environmental Sciences*. We would like to get feedback on your conference experience to understand the benefits derived from your participation and to inform better implementation of future events. The information you provide will also be used for reporting back to our funding agency, the National Science Foundation, and will guide future work of the Environmental Data Science Inclusion Network. If you have any questions or need any support completing the survey, please contact [Alycia Crall](#).

Q3 Please rank how strongly you agree with each of the following statements relevant to your participation.

| | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|--|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| The conference met my expectations. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Participation in the conference was worth my time. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| My personal goals for attending the conference were met. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The presentations were informative. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The presenters were knowledgeable about their topics.

The breakout discussion sessions were informative.

My contributions to discussions were heard and valued.

I identified collaboration opportunities with new colleagues.

I intend to stay engaged with EDSIN now that the conference is over.

I intend to contribute to the after-conference activities of EDSIN.

Q4 Please provide any comments relevant to your above responses.

Q5 Please rank your level of satisfaction with each of the following.

| | Extremely dissatisfied | Somewhat dissatisfied | Neither satisfied nor dissatisfied | Somewhat satisfied | Extremely satisfied |
|--|------------------------|-----------------------|------------------------------------|-----------------------|-----------------------|
| Interactions with conference leadership | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Communications on conference logistics | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Keynote presentations | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Networking event at Google | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Time made available for networking at conference | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Conference venue | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Food at the conference venue | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| EDSIN group on QUBESHub website | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q6 Please provide any comments relevant to your above responses.

Q7 To what extent did each of the following increase your awareness of initiatives and available resources relevant to EDSIN?

| | A great deal | A lot | A moderate amount | A little | None at all |
|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Lightning presentations | <input type="radio"/> |
| Keynote presentations | <input type="radio"/> |
| Poster sessions | <input type="radio"/> |
| Networking event at Google | <input type="radio"/> |
| Breakout discussion sessions | <input type="radio"/> |
| EDSIN group website on QUBESHub | <input type="radio"/> |
| EDSIN social media posts | <input type="radio"/> |

Q8 To what extent did the exchange of ideas that took place at the conference influence the ways in which you think about diversity, equity, and inclusion across STEM fields?

- A great deal
- A lot
- A moderate amount
- A little
- Not at all

Q9 Please provide any comments relevant to your above responses.



Q11 What do you feel was the most useful aspect of the conference?

Q12 What would you change about the conference?

Q13 Please provide any additional comments relevant to your experience as a conference participant.

Q14 Your responses to the following questions are not required but will help our funding agency, the National Science Foundation (NSF), demonstrate to what extent the conference reached individuals from groups currently underrepresented in STEM and the diversity of perspectives represented at the conference. When we report this information, data will only be reported in the aggregate.

Q15 Please select your age range.

- I do not wish to provide.
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 or over

Q16 Please select your gender.

- I do not wish to provide.
- Male
- Female
- Non-binary
- Other

Q17 Please select your race/ethnicity. Select all that apply.

- I do not wish to provide.
- American Indian or Alaska Native

- Asian
- Black or African American
- Non-white Hispanic or Latinx
- Native Hawaiian or Pacific Islander
- Middle Eastern
- White
- Of more than one race

Q18 If you did not see your race/ethnicity in the list above, or if you would like to be more specific, please enter your preferred ethnic description here.

Q19 Are you actively serving in the military or a military veteran?

- I do not wish to provide.
- Yes
- No

Q20 Please indicate if you have any of the following disabilities.

- I do not wish to provide.
- Hearing impairment
- Visual impairment
- Mobility/orthopedic impairment
- Other disability
- None

Q21 Your responses to the following questions are optional but will help us better understand how you define your identity in relation to your conference participation. We understand that an individual's identity is more than what can be captured by pre-defined categories and wanted to provide the opportunity for you to include details on how you identified in this physical (conference) space. Your response to these open-ended questions will be used as part of a broad data analysis project. In order to respect privacy, responses will only be "close read" by evaluators not familiar with participants.

Q22 Why did you come to this physical space?

Q23 How do you understand your identity in this physical space?

Q24 How did you feel in this physical space?

Q25 What are you bringing back to your community and/or individual practice from the conversations in this physical space?
