

Advisory Committee for Environmental Research and Education (AC ERE)

October 22-23, 2020

Summary Minutes

Committee Members in Attendance: Raymond Arnaudo, Megan Bang, Lora Billings, Ann Bostrom, Andrés Clarens (Chair), Peter Huybers, Charles Isbell, Kimberly Jones, Maria Carmen Lemos, Amanda Lynch, Julia Parrish, Diane Pataki, Benjamin Preston, Anu Ramaswani, Jeanne VanBriesen, Lisa White

Guest Speaker: Christopher Schell (University of Washington, Tacoma)

NSF Staff: Brandi Schottel (OIA, Executive Secretary for AC ERE), Suzi Iacono (Office Head, OIA), Steve Meacham (Section Head, OIA), Sean Jones (Assistant Director, MPS), Karen Marrongelle (Assistant Director, EHR), Richard Yuretich (Program Director, GEO/EAR), Anne-Marie Schmoltner (Program Director MPS/CHE), Scott Freunds Schuh (Program Director, SBE/BCS), Bruce Hamilton (Program Director, ENG/CBET), Brandon Jones (Program Director, GEO/OAD), Debasis Majumdar (Program Director, MPS/DMR), Jeff Forbes (Program Director, CISE/CNS), Christine Grant (Program Director, ENG/EEC), Antoinette WinklerPrins (Deputy Division Director, SBE/BCS), Fay Cobb Payton (Program Director, EHR/HRD), Joanne Tornow (Assistant Director, BIO), Irina Dolinskaya (Program Director, ENG/CMMI), Mark Hurwitz (Program Director, SBE/SES), Gregory Anderson (Program Director, GEO/OPP), Sethuraman Panchanathan (NSF Director), F. Fleming Crim (Chief Operating Officer/OD), Brain Stone (Chief of staff/OD), Angel Ntumy (NSF Contractor OIRM/DAS).

Notetakers: Ashley Pierce (AAAS S&T Policy Fellow, CBET), Megan Postema (AAAS S&T Policy Fellow, GEO), Amanda Shores (AAAS S&T Policy Fellow, GEO)

Thursday – Oct. 22, 2020

NSF Senior Hosts: Suzi Iacono (Office Head, OIA), Sean L. Jones (AD MPS), Karen A. Marrongelle (AD EHR)

10:00 – 10:20a Welcoming Remarks, Andrés Clarens (AC ERE Chair), Suzi Iacono (Head, OIA), Sean Jones (AD MPS), Karen Marrongelle (AD EHR)

Dr. Clarens welcomed the committee, thanked everyone for attending, and noted that the committee is incredibly busy with multiple members sitting on multiple subcommittees.

Dr. Iacono welcomed the committee and introduced the two new members, Dr. Kimberly Jones, Associate Dean for Research and Graduate Education from Howard University and Dr. Amanda Lynch, Sloan Lindemann and George Lindemann, Jr. Distinguished Professor at Brown University. Dr. Iacono recognized the service of Dr. Pati Matrai, who rotated off the committee. Dr. Iacono provided an update about NSF's budget, noted that the quadrennial revision of NSF's strategic plan had begun, and requested comments from the committee about how it thought the plan should evolve from the current strategic plan. Dr. Iacono briefly went over the schedule for the meeting and gave some cross-NSF updates on Growing Convergence Research ([GCR](#)) and the Established Program to Stimulate Competitive Research ([EPSCoR](#)). Dr. Iacono then introduced the NSF senior co-hosts, Dr. Sean Jones (AD MPS) and Dr. Karen Marrongelle (AD EHR).

Dr. Sean Jones gave a brief welcome and expressed excitement about the broadening participation focus for the day.

Dr. Marrongelle also gave a brief introduction and welcome and thanked the committee for taking on the “convergence of research and education” component.

12:30 – 1:30p NSF Program Updates

Dynamics of Integrated Socio-Environmental Systems (DISES), Richard Yuretich (GEO/EAR)

Dr. Yuretich introduced the DISES program and explained the evolution from Dynamics of Coupled Natural and Human Systems ([CNH](#)) to [CNH2](#) to Dynamic of Integrated Socio-Environmental Systems ([DISES](#)). DISES is managed collaboratively by BIO, GEO, and SBE. DISES focuses on socio-environmental systems and supports projects that will advance the science of the interactions between natural and human systems. Several award highlights were presented, and it was noted that November 16, 2020, is the next deadline for proposals.

Critical Aspects of Sustainability (CAS), Anne-Marie Schmoltner (MPS/CHE)

Dr. Schmoltner introduced Critical Aspects of Sustainability ([CAS](#)) to the committee, which is a meta-program description that directs researchers to core programs for funding. As such, the meta-program does not have an official budget. MPS, ENG, and GEO are involved with CAS which is a follow-on to Sustainable Chemistry, Engineering, and Materials ([SusChEM](#)). Awards by CAS started mainly last summer with strong collaboration across NSF. The program description for CAS and plastics is still active.

Human-Environment and Geographical Sciences (HEGS), Scott Freundsuh (SBE/BCS)

Dr. Freundsuh gave an overview of the background, vision, emerging themes, and funding for Human-Environment and Geographical Sciences Program ([HEGS](#)). It was noted that the program supports projects that are expected to yield results that will enhance, expand, and transform fundamental geographical theory and methods in a more interdisciplinary way, and that there has been some reorienting around these topics in the program. January 19, 2021, is the next proposal deadline.

Questions following the presentation focused on funding and number of proposals. Funding has largely remained the same, and fewer proposals were submitted in August 2020 compared to previous years, possibly due to COVID-19.

Sustainable Regional Systems Research Networks (SRS RNs), Bruce Hamilton (ENG/CBET)

Dr. Hamilton introduced the Sustainable Regional Systems Research Networks ([SRS RNs](#)) solicitation released in September, focused on advancing fundamental research on regional systems that are beneficial for humans and the environment. Two tracks are available for funding: (Track 1) full research network grants and (Track 2) planning grants. Teams should be interdisciplinary and multi-institutional. The solicitation is supported by all seven directorates and two offices, OISE and OIA. Proposals are due January 11, 2021.

Questions focused on the format of the large networks, which extend the scale of project that can be funded, based on feedback from the community. Another question inquired about the ability of early career professors to take the lead on these large center awards.

1:40 – 3:00p NSF Broadening Participation Panel, Introduced by Sean Jones (AD MPS) and Karen Marrongelle (AD EHR), Moderator: Andrés Clarens (AC ERE Chair)

Dr. Clarens introduced the panel, noting that it is a topic that is important to his own field, engineering. It is his hope that the AC ERE will be able to provide advice on broadening participation in the environmental sciences. Dr. Clarens reminded the committee that [CEOSE](#) released a [report to Congress](#) two years ago that discussed interesting ideas about engaged research. The goal of the current session was to get a sense of the activity going on at NSF. Dr. Clarens then introduced Dr. Karen Marrongelle and Dr. Sean Jones.

Dr. Marrongelle thanked the AC ERE for making space to discuss broadening participation and stated that it is fundamental to NSF's mission. Dr. Marrongelle noted that NSF is continuing to reinvent its work on broadening participation in science and engineering.

Dr. Sean Jones reiterated that broadening participation is a core value at NSF and the unrest this summer has brought this back into sharp focus. Dr. Jones noted that National Science Board had held a panel on Framing Black Experiences in Science & Engineering this summer and that NSF has also held listening sessions. NSF has a significant investment in broadening participation, and Dr. Jones looked forward to hearing from the AC ERE on how to further enhance the work at NSF.

GEO Opportunities for Leadership in Diversity, Brandon Jones (GEO/OAD)

Dr. Brandon Jones introduced the GEO Opportunities for Leadership in Diversity ([GOLD](#)) program, which came out of an Ideas Lab. The goal is to support the community, making them competitive in the "Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF [INCLUDES](#))" program and changing the culture of leadership in the geosciences to broaden participation.

Partnership for Research and Education in Materials, Debasis Majumdar (MPS/DMR)

Dr. Majumbar explained Partnership for Research and Education in Materials ([PREM](#)) as partnerships between minority serving colleges and universities and DMR-supported centers or facilities (ex. [MRSECS](#), [CHRNS](#)) to broaden participation in materials research and education. The goals are to create new opportunities for students at Minority Serving Institutions (MSIs), enhance research productivity and infrastructure, impact both institution research and culture, develop integrated research and education programs, and pursue close interaction with the partner institution and NSF. Thirty-eight awards and 2 seed funding awards have been made since the start of the program in 2004.

Broadening Participation in CISE, Jeff Forbes (CISE/CNS)

Dr. Forbes began with a graph showing that women are only 20% of the students in computer science. The [Broadening Participation in Computing](#) pilot program is meant to address longstanding computing-specific issues in recruitment of underrepresented groups and requires

broadening participation activities in a set of CISE programs. The pilot program provides resources and support for PIs and reviewers and feedback on all broadening participation plans submitted.

Broadening Participation in ENG, Christine Grant (ENG/EEC)

Dr. Grant went over the four clusters in EEC: centers and networks, engineering education, broadening participation, and workforce development. Broadening participation in Engineering ([BPE](#)) aims to recruit and retain tenure track faculty and students, increasing access to engineering, and understanding the barriers to these endeavors for underrepresented groups. There is no deadline for proposals.

Build and Broaden, Antoinette WinklerPrins (SBE/BCS)

Dr. WinklerPrins introduced the broadening participation efforts in SBE. The first, Science of Broadening Participation ([SBP](#)), supports core programs with co-funding for proposals. The second, Build and Broaden ([B2](#)), was a Dear Colleague Letter (DCL) in spring 2020 and a solicitation in development that supports the partnering of R1 institutions with MSIs. SBE is also developing a DCL on broader impacts to clarify to the research community a framework for broader impacts, including broadening participation.

NSF INCLUDES, Fay Cobb Payton (EHR/HRD)

Dr. Cobb Payton introduced NSF INCLUDES. The goal of INCLUDES is to catalyze the STEM enterprise to work collaboratively for inclusive change, resulting in a STEM workforce that reflects the population of the nation. The current NSF INCLUDES Alliances Solicitation ([NSF 20-569](#)) is active, and a [special report to the nation](#) was released earlier this year.

Discussion with panel:

The discussion that followed the presentations from the panelists touched on building off the CEOSE report and interdisciplinary efforts in different NSF programs. Programs are working to hear more community voices, to encourage authentic engagement with communities, and to bring the people to the table who are already doing the work in broadening participation. Mistrust from historical interactions must be noted and addressed for these efforts to work. There needs to be intentionality, support of a holistic student/faculty interaction, and a willingness to do the emotional work. It was stressed that there needs to be a switch from a deficit asset model to a focus on institutions and pathways of exclusion that are pervasive. The importance of combining STEM and social sciences to evaluate people and systems was also stressed, particularly in evaluating success.

3:15 – 4:00p Achieving Science Innovation through Justice, Equity, Diversity, and Inclusion (JEDI)

Guest Speaker: Christopher Schell, Assistant Professor of Ecology at the University of Washington, Tacoma

Dr. Schell spoke with the committee about how broadening participation improves intellectual merit and increases scientific innovation and discovery. Justice, Equity, Diversity, and Inclusion (JEDI) is a new acronym for envisioning STEM in the future. Dr. Schell gave some insight into his personal background in the sciences. Dr. Schell also gave some examples for why there is still a lack of representation of underrepresented groups in science. These reasons include: (1) systemic and structural problems allowing the leaky pipelines to persist, (2) diversity work being limited by

time, resources, and evaluation, (3) that a disproportionate amount of the work falls on underrepresented faculty, and (4) the “diversity-innovation paradox”- the diminished returns and acknowledgements underrepresented minorities receive for their work despite the fact that research novelty and intellectual merit increases with racial and gender diversity. Suggestions for how NSF and academic institutions can fix, reform, and support underrepresented groups included building infrastructure for the new normal, making structural changes in the short and long-term, and re-evaluating how intellectual merit itself is conceptualized, especially in the context of broadening participation.

The discussion that followed Dr. Schell’s talk touched on reimagining what makes for good intellectual merit, such as understanding how impactful the science is on a community and the ability to connect with communities. There was a question on how to measure social systems similarly to how ecological systems are measured. Dr. Schell gave an example on how socio-economic status affects what scientific questions are researched or even asked in different areas to make the point that diversity is important for thinking of all the different possible research questions, and that socio-economic differences affect the natural world. Another question touched on how to prepare people for international research. Dr. Schell pointed out that there are unified aspects across different cities to understand, though there may be different histories with racism and segregation in different cities, there may still be similar ecological impacts.

4:00 – 4:50p Broadening Participation Committee Discussion – Next Steps

Dr. Clarens started out the discussion asking committee members’ thoughts on Dr. Schell’s presentation and next steps in terms of broadening participation. He then asked if the committee wants to highlight and expand upon broadening participation in the subcommittees already in place or create a new subcommittee.

Key issues that came up in discussion were systemic and cultural issues at institutions. What can AC ERE suggest to NSF to catalyze changes at institutions? Are there equity requirements that NSF can require in order to be successful in securing funding? A joint meeting between AC ERE and CEOSE was also suggested to help challenge AC ERE to identify areas for improvement in environmental research and education. There was also a suggestion to have AC ERE present to other directorate AC meetings. It was noted that all of the subcommittees could use feedback on broadening participation in their work and that current changes happening now in this topic area are significant and quick and it is a good time to discuss changes. There was discussion on the outreach that NSF does for K-12, reimagining higher education, and what a healthy intergenerational interaction looks like.

4:00 – 4:50p Introductions to Day 2 Breakout Sessions

Dr. Clarens explained that adding a discussion with Navigating the New Arctic on day 2 of the meeting necessitated having the subcommittees introduce the topics on day 1. There will be two breakout sessions on day 2 where two subcommittees will meet to get feedback from committee members and NSF program directors and will discuss several questions. The third breakout topic is on co-production/actionable science in environmental research and education.

Public Health & Environmental Research and Education, Diane Pataki (AC ERE member)

Dr. Pataki briefed the committee on the status of the subcommittee. There is a short timeline between the June 2020 meeting where the subcommittee formed and having a draft of the report

by the end of the 2020 calendar year. The report focuses on public health and the environment and discusses how health falls at the intersection of different agencies. The subcommittee has spoken to people at NIH, EPA, and DOD so far, and welcomes feedback from NSF and the rest of the AC ERE.

The Convergence of Research and Education, Julia Parrish (AC ERE member)

Dr. Parrish reminded the committee that the Education Subcommittee was working on drafting a report where research and education are integrated with a full feedback loop. Questions to consider for the report include:

- How can we make radical improvement in systems literacy within the US population?
- How does the public become involved in science?
- How do we understand and make more explicit the role that values play in both the generation and understanding of environmental science research?
- How can we leverage non-Western ways of learning and reasoning to produce novel breakthroughs in socio-environmental problems?

Co-Production/Actionable Science, Anu Ramaswami (AC ERE Member)

Dr. Ramaswami gave an update to the committee on the co-production work. The co-production report will include:

- Definitions of the range of community-engaged research options.
- Discussions of place-based and other modes of community-engaged research to maximize benefits to people and earth systems.
- Contextualization of co-production in the spectrum of approaches for community-engagement.
- Identification of when co-production may be appropriate for specific project goals.
- Development of a baseline on co-production as used in current NSF grants.
- Documentation of impacts on fundamental discoveries, broadening participation, and other societal impacts.
- Collation of resources that help prepare research teams for co-production.
- Highlights of key research questions on co-production itself.

Friday – Oct. 23, 2020

NSF Senior Hosts: Joanne Tornow (AD BIO)

**10:00 – 10:20a Introduction and Schedule Overview, Joanne Tornow (AD BIO),
Andrés Clarens (AC ERE Chair)**

Dr. Clarens recapped the program updates, broadening participation panel, and guest speaker talk from the previous day, went over the schedule for the day, and introduced Joanne Tornow, the senior co-host for the day.

Dr. Tornow welcomed the committee and discussed the importance of environmental and public health research in BIO and on the interdisciplinarity of programs in BIO. Dr. Tornow also pointed out that broadening participation was important for BIO and mentioned some of the programs in BIO that support undergraduate and graduate students, post docs, and mid-career researchers. The advisory committee for BIO and CEOSE will also hold a joint session the following week to discuss broadening participation in BIO.

10:00 – 10:20a Co-production best practices from Navigating the New Arctic (NNA), Irina Dolinskaya (ENG/CMMI), Mark Hurwitz (SBE/SES), Gregory Anderson (GEO/OPP)

Dr. Dolinskaya a member of the Navigating the New Arctic ([NNA](#)) workgroup for about two and a half years, introduced NNA's major goals and key components. The Arctic is quickly changing, and we need to understand and respond to change with new and enhanced research communities that are diverse, integrative, and well-positioned to do NNA-relevant research. NNA research outcomes should inform enhanced education, national security, economic development, and societal well-being.

Dr. Anderson has been working on NNA for about two years. Co-production in the NNA context means integration of different knowledge systems and methodologies to systematically understand the phenomena, systems, and processes being studied in a research project, and can include indigenous and non-indigenous groups. Researchers must describe what co-production means in the specific project context. Special considerations for collaboration include research sites near arctic residents, community engagement and outreach, and co-production of knowledge when appropriate (but is not required). Co-production was not a requirement in NNA although some researchers thought it was.

Dr. Hurwitz has been working on NNA for about a year. NNA has larger grants and planning grants to support the convergence research team formation and capacity building for \$250,000 across two years. The goal is to provide resources to build partnerships, understand cultural norms, and broaden participation for individuals and organizations with limited experience with NSF. There should be a level of documentation of these partnerships in any proposal.

The discussion that followed touched on the long timelines required to build connections between researchers and communities. A committee member brought up that there is no required training for community-based participatory research, which may lead to harm being done in these communities without compliance requirements. NSF is interested in looking into this but is also interested in having the community determine best practices. There was also a comment on participatory science and what it might look like if NSF is forward thinking in changing the science across social experiences and scientific methods.

12:10 – 12:55p Breakout Session 1
Co-Production, Maria Carmen Lemos and Anu Ramaswani (AC ERE members)

Education, Megan Bang and Julia Parrish (AC ERE members)

Public Health & Environmental Research and Education, Diane Pataki (AC ERE member)

1:15 – 1:45p Preparation for Discussion with NSF Senior Leadership

The Committee discussed updating the Director on its public health and environment, education, and co-production work. The Committee was also interested in discussing the future of education and the continued NSF response to COVID-19.

2:00 – 3:00p Discussion with NSF office of the Director, Sethuraman Panchanathan (Director), F. Fleming Crim (COO/OD), Brain Stone (Chief of staff/OD)

Dr. Iacono and Dr. Clarens both welcomed Dr. Panchanathan and Dr. Crim. The Committee introduced themselves to the Director and Dr. Crim.

The Director laid out the strategy for NSF to strengthen research at speed and scale into the future based on three pillars; 1) advancing the frontiers of research, 2) ensuring accessibility and inclusivity, and 3) securing global leadership supported by co-creation, innovation, and partnership. The Director noted that the country was in the midst of a defining moment. Dr. Panchanathan emphasized partnerships (inter-agency and industry), people (the missing millions), and translation (not just to industry).

Dr. Clarens noted that the Committee came from across the disciplines at NSF and engaged in environmental field work and other styles of research that are particularly impacted by COVID-19. Dr. Clarens also noted that the Committee was focused on broadening participation and was happy to see both of these issues addressed by the Director. The Committee then gave updates to the Director on the status of their reports, next steps.

3:00 – 3:45p Breakout Session 2

Co-Production, Maria Carmen Lemos and Anu Ramaswani (AC ERE members)

Education, Megan Bang and Julia Parrish (AC ERE members)

Public Health & Environmental Research and Education, Diane Pataki (AC ERE member)

4:00 – 4:30p Report-Out from Breakout Sessions

Public Health & Environmental Research and Education, Diane Pataki (AC ERE member)

Dr. Pataki reported receiving good feedback on the report draft and that there was general support from the program directors who attended. The key points discussed were including the economic benefits of protecting health and the environment, the need for international collaboration, the need for interagency collaborations and the added workload these create, cultural and language gaps, the expansion on non-communicable diseases in the report, the inclusion of ecotoxicology as a research funding gap, explicitly addressing the “One Health” perspective, discussing structural barriers at the intersection of public health and the environment, pointing out that RAPIDs and EAGERS are small and preclude interdisciplinary research teams, and considering the issue that health scientists are generally 100% soft money. This last issue is why NIH grants are so large. There was an additional comment in this report-out session regarding the difficulty of co-reviewing with multiple programs at NSF.

Co-Production, Maria Carmen Lemos and Anu Ramaswani (AC ERE members)

Dr. Ramaswami also reported receiving good feedback on the outline. The sections of the report will describe co-production and draw on the literature, broadly discuss power differentials, address scaling co-production products, and provide a discussion on what is being co-produced in different project types. The main areas of co-production impact include discovery, broadening participation,

and societal impact. These impacts will be discussed using diverse examples from NSF. Some important things to address in report include best practices and the challenges, evaluation of co-production, and emphasizing the benefits of coproduction. The report audience will be NSF program directors, the research community, reviewers on panels, and practitioners of co-production.

There was a comment to encourage the addition of citations of various literature and different terminologies and methods such as: engaged, participatory, community-based, co-produced, user inspired, translational, knowledge to action etc. The references and key papers would add value.

Education, Julia Parrish (AC ERE member)

Dr. Parrish noted that environmental research often takes precedence over environmental education. The Committee should challenge themselves to engage in environmental education. During the breakout sessions, a set of topics were discussed, including the concept of a student as a lifelong learner, creating something that is bigger and more exciting than just K-12, community-based, and place-based learning concepts, concepts of who is an expert and has agency, and addressing where people get their learning from. Some other points that were discussed include that youth especially are delighted to be outside, and yet when we get to environmental science and learning, it is more about the world falling apart around them. The report will address some potential methods to allow research to capture wonder a bit more and balance this better with worry about the environment. There was also a discussion on how to radically change the current system.

Moving forward, there is a need to fully integrate education and research at NSF and to address the space between the two. Part of the goal is to figure out how to define that empty space. An option is a science and technology center that is focused on education and research integration.

4:30 – 5:00p Wrap-up Discussion and Committee Business

The Public Health Subcommittee needs to add direct feedback into the report and fill out a couple of sections. They will aim to have a draft of the report by the end of the calendar year. Dr. Iacono pointed out that the Director will be working on his second hundred days at NSF by that time and reports from the AC ERE will be helpful in supporting his ideas. Having reports done by the end of the calendar year and before the next AC ERE meeting is ideal. The implementation plan and report dissemination campaign need to be established.

Dr. Meacham noted that emerging research should be included in the next NSF strategic plan. Dr. Meacham will be collecting information for the strategic plan through April but having something in by the end of the calendar year will be helpful.

Co-production will become a formal subcommittee and start working on a full report. There was discussion about adding someone to the subcommittee or finding someone in CEOSE to help co-produce the report.

The Education Subcommittee is reaching out to committee members for feedback and involvement. They will focus on exploring the space between research and education. The goal is to have a draft by the next AC ERE meeting. This will likely be a relatively short report.

The Environment and Security Subcommittee gave a brief update on the security draft. They have already received feedback from NSF program directors on the draft, and a couple more subcommittee members and the interviewees will give feedback. The goal is to have a draft out to the committee to read by the end of the calendar year. The subcommittee will also need to start thinking about the plan for disseminating this report.

It was also agreed that someone in each subcommittee should specifically look at broadening participation in all the initiatives.

Minutes from June 5th meeting were approved by the Committee.

Dr. Schottel and Dr. Clarens then thanked everyone who participated and closed the meeting.