



**YEAR 8 ANNUAL REPORT OF THE
NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER**

Reporting on Activities from September 2018 to August 2019



www.SESYNC.org



INTRODUCTION

SESYNC's mission is to foster synthetic, actionable scholarship related to the structure, functioning, and sustainability of socio-environmental (S-E) systems. SESYNC was founded on the premise that progress toward a sustainable future requires new knowledge that arises from close collaborations across many disciplines including, for example, the natural, social, and computational sciences and involving academia, federal and state agencies, and non-governmental organizations. To achieve this mission, SESYNC catalyzes a rich portfolio of synthesis activities and provides essential support services that have helped researchers, policy-makers, and representatives of many different groups to work together to discover solutions to socio-environmental problems. In this way, we have fostered the production of actionable science. SESYNC works with the world's leading natural, social, and computational scientists who travel to its Annapolis facility. There they develop and utilize collaborative teamwork skills to advance transdisciplinary synthesis research to address the fundamental challenges posed by S-E problems.

SESYNC's diverse offerings of programs, processes, and training are designed to accelerate knowledge generation, build new communities, and educate and engage early career scholars and educators. By building new capacities among many communities, SESYNC works to lower the barriers to adopting unfamiliar synthesis methods, and to grow the synthesis process. We place a premium on flexibility and openness to new ideas from the community – not only topically but on methods of engagement and synthesis team building. We are actively engaged with all of the teams that work at the Center and practice “gentle interventions” to help them overcome hurdles.

Over the course of this grant year, SESYNC leadership and staff worked to fulfil our commitment to core activities through Pursuits, Workshops, Foundations, and Fellowships – efforts that enable the Center to serve the needs of a diverse and growing community of users in a manner consistent with our mission.

CAPACITY-BUILDING FOR S-E SYNTHESIS

Postdoctoral Training. SESYNC supports postdocs for two-year fellowships at our center. During this reporting period, we supported 12 postdoctoral fellows on this award. Fellows conducted original synthesis research and participated in SESYNC's Socio-Environmental Immersion Program. Each postdoc has one or more collaborating mentors to support technical or novel aspects of their research and to help expand their professional networks. These mentors came from many different disciplines and home institutions and had no prior collaboration with their Fellows. SESYNC facilitated these interactions by providing travel funds for the Fellow and mentor to visit each other.

In addition to their research, Fellows participate in SESYNC's Socio-Environmental Immersion Program, an education and training program intended to enhance interdisciplinarity and understanding of socio-environmental synthesis, identify and support new communities of socio-environmental researchers, and increase Fellows' capacity for working in teams and conducting actionable science. This year, the program consisted of four two-day workshops, each focused on the theory, methods, research topics, and career opportunities of a specific discipline. The disciplines

covered in the 2018- 2019 academic year were: team science, hydrology, land system science, and qualitative methods in social sciences.

Drs. Julie Silva and Christine Maietta served as on-site postdoctoral mentors, and they both helped Fellows build professional development programs. Drs. Silva and Maietta maintained an open-door policy to consult with Fellows as needed. Along with other SESYNC staff, they provided guidance and feedback on topics including preparing job applications, developing grant proposals and budgets, preparing effective research presentations, and building research networks.

In addition to informal mentoring, Dr. Silva met individually with incoming Fellows in the fall of 2018 to help them conduct self-assessments and discuss their goals. She conducted annual reviews with the first-year fellows in April 2019 in order to provide constructive feedback on their progress and identify ways SESYNC could assist them in achieving their goals in the second year of their fellowship. First-year fellows also presented their research to the SESYNC community as part of an organized mini-symposia in the spring of 2019.

Additional opportunities for postdocs included: visiting program officers and scholars at the National Science Foundation; participating in the review panel for 2019-2020 Postdoctoral Fellow applicants; meeting with visiting scholars and seminar speakers; giving practice talks for conferences and interviews; gaining teaching experience through contributions to short courses or some teaching on the main University campus; and attending a science communications workshop led by SESYNC Senior Communications Fellow Lisa Palmer. These efforts are designed to help build the full suite of professional skills needed to become successful scholars.

Graduate Student Training. SESYNC offered the sixth "Graduate Student Workshop for Socio-Environmental Synthesis" in August 2018 and a sixth RFP for Graduate Student Pursuits was issued with a November 2018 deadline. Workshop attendees were introduced to training and skill-building opportunities in the areas of socio-environmental systems thinking, data-driven synthesis, team science, science communication, and interdisciplinary research design and proposal development. The Graduate Pursuit program allows participants to continue to hone the above skills while leading independent research projects in areal-world context.

As part of a continued effort to increase the reach of the Graduate Student Pursuit RFP and to accelerate team formation, two informational webinars were held in September. Webinars gave participants an opportunity to ask questions about the RFP and program, pitch ideas, and advertise skillsets to find compatible teams. From the November RFP, 4 additional Graduate Pursuit teams were supported, for a total of 16 graduate student teams supported under this award.

Leaders of Graduate Pursuit teams are invited to SESYNC for a specialized training focused on best practices and capacity building in scientific leadership and project management. Training and professional development opportunities continue for the entirety of a Graduate Pursuit, with SESYNC staff regularly mentoring individuals on teams, facilitating team meetings, and meeting design, guiding synthesis strategies and execution of results, coaching through project management and team science challenges, contributing to conflict resolution, and supporting the dissemination of results.

In March, we announced the seventh Graduate Student Workshop on S-E Synthesis to be held in August 2019, at which time the next RFP will be issued for Graduate Pursuits. 2019 has also seen the

creation of new international Graduate Pursuit project representing a student training collaboration between SESYNC/University of Maryland, Helmholtz Centre for the Environment in Germany, and the University of Leeds. 12 interdisciplinary students from the three universities will come together to investigate the effects of agricultural subsidies on socio-environmental outcomes, with meetings designed around a balance of practical synthesis research experience and lectures and activities conveying synthesis best practices and team science theories. The first of these meetings took place in May 2019.

Short Courses. SESYNC continues to offer a comprehensive set of short courses designed to strengthen professional skills and build capacity in the research community. In 2019, we are offering the following short courses:

- *Geospatial Data Analysis:* This course introduced participants to open-source tools for geospatial and temporal analysis of vector and raster data. The workshop emphasized R packages and Python libraries commonly used in GIS.
- *Bayesian Modeling for Socio-Environmental Data:* This annual short course covers the basic principles of Bayesian hierarchical models, a powerful approach to analysis of complex socio-environmental problems that require synthesis of knowledge.
- *Introduction to Social and Ecological Network Analysis:* This annual short course is taught by two former SESYNC postdocs and serves as an introduction to the theory and practice of Social and Ecological Network Analysis. This course is intended as a foundational course for anyone interested in adding network analysis to their analytical toolkit.
- *Introduction to Spatial Agent-Based Modeling (ABM):* This annual short course provides an introduction to the theory and practice of spatially-explicit ABM. Students learn the essential theoretical background and technical expertise needed to conceptualize, build, and analyze their first ABM. The course is designed for students with little to no prior experience with programming and/or developing ABMs.
- *Summer Institute on Cyberinfrastructure for Socio-Environmental Synthesis:* This annual short course offers participants hands-on instruction and project-focused coaching on software tools available through open-source licenses or widely available at most research institutions. The course combines lectures, hands-on computer labs, and project consultation designed to accelerate the adoption of cyber resources for all phases of data-driven research and dissemination. It is led by our cyberinfrastructure and data science team.
- *Socio-Environmental Synthesis with Case Studies:* Through this annual short course, participants learn about the case study method for teaching and discuss the concepts and competencies students need in order to understand complex socio-environmental problems. Participants design and create case studies for teaching, which will be shared on the SESYNC website.

IMPACT

Socio-Environmental Science. SESYNC has focused on using all of our resources to fully implement programs and processes that reflect our commitment to advancing the capacity of individuals and teams to advance socio-environmental synthesis and science. Our continuing engagement cuts across numerous disciplines and impacts key areas — all consistent with our refined theory of change. We have

challenged ourselves to advance understanding in new areas and to help participants in new ways. Iteration with SESYNC staff and detailed feedback from reviewers remains an essential element and has a high impact on those that apply for support, ultimately leading to stronger research projects. Our research support “practice” has continued to evolve and improve how we provide an integrated approach to learning the specific needs of each research team and to match our capacity to help accelerate the work that the community brings to the center. Based on our preliminary review of our ongoing evaluation, this effort has had a clear impact on teams over the past year.

We have continued to refine and expand our effort to help all participants recognize that the processes that enable productive interdisciplinary teamwork need to be undertaken purposefully across all aspects of their work at the center. Our efforts to help teams with meeting design and to work through various challenges with interdisciplinary collaboration (including bridging epistemological differences and understanding hierarchy and ownership issues, as well as understanding both in-person and virtual communication strategies to maintain project momentum) have accelerated in the past grant year.

Over the past year, SESYNC expanded its efforts to engage and ultimately impact early career scholars. We have focused special attention on the Postdoctoral Fellows and the associated Postdoctoral Immersion Program. In addition, we have expanded the Graduate Student Research Fellows Programs, with new opportunities and enhanced mentoring of graduate student team leaders. Short courses and selected workshops continue to be oversubscribed, indicating the reach and impact of these offerings. Feedback from these efforts continues to show that we are impacting scholars across multiple career stages and helping them build technical and new interdisciplinary skills that they take to their SESYNC research projects and importantly, back to their home institutions.

SESYNC’s efforts to advance S-E modelling ramped up in the past year, reflecting our long-term commitment to making fundamental advances. Early interactions with leaders of the RFF-SESYNC SE-modeling Pursuits found universal excitement among them and the participants on their teams. They see this opportunity as a way to new insights and technical approaches that can help produce new modeling approaches. The impact of this on multiple disciplines should become evident over the next 1-2 years.

A Focus on Interdisciplinary Process. The SESYNC programs team has invested a significant amount of time during this reporting period to assist participants in identifying scholars and knowledge users (see definition in the next paragraph) that are needed to address their research questions. Disciplinary diversity within teams is a key component of the evaluation process, and often, members of SESYNC’s Scientific Review Committee provide participant suggestions to teams during the iteration phase of the proposal review process (prior to support) in order to both increase the disciplinary breadth of participants and to ensure the right expertise is represented on the team. Disciplinary diversity within and among teams is clearly very high, however we continue to note that when participants are asked to self-characterize according to the disciplinary categories that NSF (and SESYNC) use, they report that these are somewhat confining. Many of our participants feel that they cut across several disciplinary lines, a trend which is increasingly common throughout science. In the demographic survey, we ask participants to self-characterize themselves (e.g., natural scientist, social scientist, government, etc.), and in addition, we categorize participants as either "scholars" or "knowledge users" based upon their selection for “institutional status." Scholars (or "academics") are those within academic institutions as graduate/postdoc students and teaching or research faculty, and knowledge users are those within the policy, business/industry, government, or NGO/nonprofit sectors. Of those reporting demographic information from our core programs supported from this award, 19% of SESYNC participants come from

outside academia and 60% of the 55 research teams reporting include knowledge users. Such sectoral diversity is key in the SESYNC model and helps ensure actionability.

As previously mentioned, all SESYNC participants are asked to self-characterize as falling into one of the following categories: natural scientist, social scientist, both natural and social scientist, computer scientist, policy, NGO, government, business/private sector, or other. Of the participants from all programs (Pursuits, Workshops, Foundations, and Short Courses) who responded to the self-characterization question (response rate = 75%), 308 chose natural scientist (36%), 229 chose social scientist (26%), 209 reported as both natural and social scientist (24%), and 10 chose computer scientist (1%). The remaining participants self-reported as NGO, government, policy, or industry (65 individuals, 8%) or other (46 individuals, 5%).

Of those reporting from just our core synthesis research programs (Pursuits, Workshops, and Foundations), there were 503 academic scholars, 109 knowledge users, and 10 participants who classify as both. Of the core participants classified as knowledge users, 49% came from the NGO/non-profit sector, 42% from the government sector, and 9% from business or industry. Of the core participants classified as academic scholars, the disciplinary diversity of those responding to the demographic survey is illustrated below. Participants were asked to describe their primary disciplinary area of expertise, which is used to assign them to one of the research domains, aligned roughly with NSF's research areas:

Life sciences: 27%

Geosciences: 17%

Non-Economic Social Sciences: 27%

Economics: 6%

Computer Science and Engineering: 3%

Policy: 7%

Humanities: 5%

Other (e.g., business, education, public health): 8%

We have also continued to impact other disciplines through work with Bethany Laursen, a doctoral student in applied philosophy from Michigan State University. She has now completed her internship at SESYNC and is continuing to collaborate with Dr. Nicole Motzer in the development and pilot testing of a new methodology and reproducible rubric for evaluating manuscripts produced by synthesis teams with the goal of determining the level of interdisciplinarity and integrative science. The collaboration will result in a presentation at a national meeting in May and two manuscripts are currently being drafted.

Actionable Science. Actionable scholarship is often under-rewarded within academia, and academic researchers often lack the training and experience needed to productively interact with knowledge users and to address public policy questions, as opposed to purely academic questions. SESYNC helps the academic community develop the policy skills, research questions, and partnerships needed to produce innovative actionable scholarship. We provide this support both through support for research groups such as those described above and through more targeted skills training. We provide policy education to our graduate student and postdoc participants via seminars on institutions, laws and regulations, and natural resource management applications. As a specific example, we provide a regular

Policy Immersion unit as part of our Post-Doctoral Immersion Program, which includes a basic grounding in public policy issues, institutions, and approaches to collaboration between scientists and decision

The following are current examples of policy-relevant actionable scholarship supported by SESYNC:

- Pursuit: Soil as a Social Ecological Feedback. This project focuses on the role of soil health in achieving agricultural resilience to weather extremes. The team is exploring the ability of soil conservation practices to buffer agriculture production to changes in precipitation and heat variability and the uptake of conservation practices by landowners. The research team includes representatives from the US Department of Agriculture and the team is engaging with groups including the National Farmers Union, General Mills, Soil and Water Conservation Districts, and the American Farmland Trust.
- Pursuit: Linkages Between Water Scarcity-Induced Conflict and Land use/Land cover Change in Africa. The goal of this project is to develop policy recommendations for natural resource management institutions in Africa to help manage conflicts arising from water scarcity. The group is using natural and social science data to describe the dynamics of water scarcity over large scales with the goal of giving local institutions the ability to better predict and resolve conflicts. The project team involves and will engage with a variety of local government and NGO stakeholders.
- Graduate Pursuit: Socio-Environmental Watershed Typologies Based on Storm Water Pollution. This graduate student team is developing tools to relate the social, ecological, and technological features of urban watersheds to storm water pollution. The goal is to better inform municipal storm water authorities and urban planners about the factors and strategies that drive storm water quality problems and improvements.
- Pursuit: Legal Design Principles of Government-Supported Adaptation. This group is focused on how government institutions can promote adaptive governance of socio-environmental resources, with an emphasis on “decentralized” approaches that involve local communities, businesses, and NGOs. The group includes legal experts and government representatives with expertise in delegated water resource governance, inter-state compacts, and novel network governance approaches. They will focus on practical recommendations for how water management and city greenspace institutions can be designed in order to both reduce conflict and achieve better

Human Resources. Through this reporting period (as of May 2019), SESYNC has supported 1157 total individual participants on this award representing 69 initiated projects (Pursuits, Foundations, Workshops, and Short Courses). We received 55 applications for postdoctoral fellowships in December 2019, as well as 18 proposals for team synthesis projects from the biannual Pursuit and Workshop RFP in October 2018, 9 proposals from the Graduate Student Pursuit RFP in October 2018, and an expected 25 proposals for team synthesis projects from the biannual Pursuit and Workshop RFP in May 2019.

For those participants who filled out SESYNC's demographic survey through May 2019, the following percentages illustrate SESYNC's cumulative impact from this award on the development of human resources (from September 2016 through this reporting period). The response rate for the demographic survey is 77% for this award.

Of those reporting, SESYNC has supported 421 men, 536 women, and 2 non-binary people (44%, 56%, <1% respectively; note that the non-binary option was added to our survey only in March 2019).

Approximately 81% of participants are from the United States (representing 49 states) and 19% of participants are international (representing 35 countries).

As mentioned in the previous section, we support participants from a wide range of disciplines and institutions. When asked to self-characterize, reporting participants from all SESYNC programs (including Pursuits, Workshops, Foundations, and Short Courses), responded as follows: 308 chose natural scientist (36%), 229 chose social scientist (26%), 209 reported as both natural and social scientist (24%), and 10 chose computer scientist (1%).

The remaining participants self-reported as NGO, government, policy, or industry (65 individuals, 8%) or other (46 individuals, 5%). The racial and ethnic diversity of all SESYNC participants on this award who responded to the question (69% response rate) is illustrated in the percentages below versus All Biological Science Degrees, US Citizen and Permanent Resident (2012) from the National Science Board Science and Engineering Indicators in parentheses:

White: 70% (67.6%)

Asian or Pacific Islander: 11% (11.7%)

Black: 4% (4.7%)

Hispanic: 5% (5.8%)

American Indian or Alaska Native: <1% (0.6%)

Multi: 10% (Indicators category of “Other or Unknown Race or Ethnicity”: 9.6%)

SESYNC continues to strive for diversity and inclusivity across all of our programs in order build a stronger community of socio-environmental researchers.

Societal Impact. A core aspect of SESYNC’s mission is to foster actionable scholarship. Actionable scholarship is research with the potential to inform decisions within government, business, and households; improve the design or implementation of public policies; influence public or private sector strategies; and inform planning and behaviors that affect the environment. SESYNC takes a deliberate approach to fostering actionable research. Many of our synthesis teams directly engage non-academics who we refer to as “knowledge users.” Knowledge users from the business community, government agencies, and the NGO sector enrich our scholarship in a variety of ways. They help frame research questions that emphasize solutions to socio-environmental problems, stimulate creativity by asking different kinds of questions, provide guidance on policies and institutions affecting environmental decision making, and help communicate the work to broader audiences. Interaction with knowledge users occurs across our programs and throughout our engagement with teams. From the proposal solicitation to proposal reviews and to facilitation and support of research teams, SESYNC actively encourages the engagement of non-academic experts in its work. We help recruit these participants and work with teams to integrate policy, institutional, and natural resource management insights into their research plans.

Other teams undertake projects that potential knowledge users have identified as important to our mission. Participants from at least 75 non-academic institutions have come through the center during the first three years of this award. Of those reporting demographic information from our core programs supported from this award, 19% of SESYNC participants come from outside academia and 60% of the 55 reporting research teams include knowledge users.

Non-academic knowledge users are also represented on both the External Advisory Board (e.g. World Resources Institute, RAND Corporation, NOAA, Walton Family Foundation) and the Scientific Review Committee (e.g., Union of Concerned Scientists, Resources for the Future, Conservation International, US Geological Survey). SESYNC embraces a spectrum of actionable scholarship, from fundamental research needed before more applied research can move forward, to research on broad, global socio-environmental issues, to research that informs more specific policy questions.

DISSEMINATION OF RESULTS

Development of a Communications Toolkit: SESYNC-supported research helps answer some of the greatest environmental challenges, and researchers often convey it with technical language in journals. Many of the Center’s research findings have broader application to social and environmental issues. The communications team developed a [toolkit website](#) comprising exercises for translating and communicating, tips on working with different audiences, templates, and instructional videos. The goal of this website is to provide a set of resources for teams to build communications capacity that will complement the in-person resources available from staff at SESYNC.

Expanding SESYNC’s Web Presence: The base of our communications and outreach strategy involves actively developing networks to connect researchers to key knowledge users and decisions makers. We have continued to maintain a strong web and social media presence during this year of the award. In the current grant year as of April 2019, the SESYNC website received 37,298 total visits. Aside from the homepage and our opportunities page, we received the majority of traffic on pages describing our Postdoctoral Fellowship Program, biannual RFP for team-based Pursuits, People at SESYNC, and Careers. The SESYNC website also hosts press releases and guest blog posts about SESYNC research. SESYNC’s social media channels—which include Facebook, Twitter, YouTube, and LinkedIn—have been extremely successful tools for reaching and engaging new audiences within the scholarly community, with a primary goal of driving those audiences to dynamic content on our website. Audiences for our social media channels have all grown during the past year: Twitter followers have increased from 4,659 to 5,440 as of April 2019 and our Facebook community has grown from 1,178 to 1,275. Our Monthly newsletter currently reaches 3,993 people. The SESYNC YouTube channel now has 1,883 subscribers and the videos have received a combined 115,900 views

Outreach. SESYNC's Senior Fellow for Socio-Environmental Understanding, Lisa Palmer, takes part in national and international dialogue on S-E issues through writing and publishing, public speaking, leading, and developing seminars, developing the communication capacity of SESYNC synthesis teams, and communicating science of SESYNC to new audiences. The Senior Fellow co-produced and advised on the Research-in-Action video series, created presentations and communication products for building strategic communication capacity for research teams, consulted with synthesis teams on how to RPPR - Preview Report [https://reporting.research.gov/rppr-web/rppr?execution=e1s4\[5/14/2019 4:39:23 PM\]](https://reporting.research.gov/rppr-web/rppr?execution=e1s4[5/14/2019 4:39:23 PM]) communicate the broader impacts of SESYNC-supported research, produced original content for online media, and wrote news releases for national and international media coverage of research by SESYNC research teams and postdoctoral fellows. Additionally, members of the SESYNC leadership team have been invited to share results and lessons learned with a growing community of interdisciplinary research

organizations. For example, Director for Interdisciplinary Science Jonathan Kramer was a 2019 Lansdown Visiting Scholar at the University of Victoria. He gave two lectures and met with faculty and administrators to provide advice on the development of a new interdisciplinary initiative focused on socio-environmental synthesis.

MAJOR ACTIVITIES

SESYNC has a variety of mechanisms to support synthesis research and capacity building. In total these programs contribute to our research, education, and cyberinfrastructure goals and mission in an integrated manner. We have rapidly moved to fully implement these programs and have supported 80 Pursuits, Foundations, Workshops, and Short Courses to date on this award through year three. During this reporting period, we've initiated support for the following new projects and participants:

Pursuits: Collaborative team-based synthesis projects focused on a pressing socio-environmental problem. These projects focus on rotating Themes. In the current grant year, we had three open RFPs and supported 22 new Pursuits, 11 of which are composed of graduate students. We also offered continuing support for 21 Pursuits that were initiated during the first two years of this award and continued their meetings and research activities this year.

Workshops: Single meetings focused on development of a new topic, underdeveloped field, or promising idea. 5 Workshops were granted support this year.

Foundations: Recruited projects on critical, emerging, or understudied topics, or efforts that bring new disciplinary perspectives to S-E scholarship. During this reporting period, we continued to support 3 existing Foundations, granted support to one new Foundation, and started developing ideas and plans for additional ones.

Short Courses: Courses teaching skills including Bayesian Modeling, Social Network Analysis, and Agent-Based Modeling. 6 Short Courses were initiated in this reporting period.

Fellowships: 12 Postdoctoral Fellows were supported in this reporting period, including 9 first-year Postdocs in a new cohort. We are finishing the review of this year's postdoc applications and will have several additional postdocs starting by fall 2019.

Newly Funded Projects. The following were granted support during this funding year:

Pursuit Cohort 18: Collaborative & Interdisciplinary Team-Based Research Projects Granted support in September 2018.

- 2018C18-019: Understanding causal pathways within complex water management systems. PI: Albert Ruhi
- 2018C18-017: New Scenarios and Models for Climate Engineering. PIs: Simon Nicholson and Christopher Trisos
- 2018C18-010: Food-Energy-Water Interdependencies of the Global Agrarian Transition. PIs: Jampel Dell'Angelo

and Paolo D'Odorico

- 2018C18-009: Legal Design Principles of Government-Supported Adaptation: Designing Effective Decentralization Programs in Cities and Vital Water Social-Ecological Systems. PIs: Daniel DeCaro and Edella Schlager
- 2018C18-007: The death and life of biodiversity: modeling extinction and resilience on islands. PIs: Siobhán Cooke and Liliana Davalos

Pursuit Cohort 19: Collaborative & Interdisciplinary Team-Based Research Projects Granted support in February 2019.

- 2018C19-018: Can enhancing diversity help scale up agriculture's benefits to people and the environment? PIs: Zia Mehrabi and Claire Kremen
- 2018C19-012: Simultaneously managing scale and uncertainty using innovative software design concepts in a tiered, system-of-systems modeling framework. PIs: John Little and Hsiao-Hsuan (Rose) Wang
- 2018C19-001: A socio-environmental synthesis of the linkages between water scarcity induced conflict and land use/land cover change in Africa to enhance multi-scalar decision making. PIs: Erin Bunting and Elizabeth Mack

Graduate Student Pursuits Cohort 5 Granted support in September 2018.

- 2018GS5-001: What's governance got to do with it? Examining the role of institutional quality in forest conservation. PIs: Rayna Benzeev and Bradley Wilson
- 2018GS5-002: Identifying Socio-Environmental Watershed Typologies Based on Stormwater Pollution Using Machine Learning. PIs: Celina Balderas Guzman and Matthew Smith
- 2018GS5-003: Power of the pen: constructing social-ecological narratives of coral reefs in news media and links to policy action. PIs: Steven Mana'oakamai Johnson and Alison Adams
- 2018GS5-005: Ch-Ch-Ch-Changes: Using Marine Protected Areas to Investigate Potential Socio-Ecological Impacts of Climate Change in Marine Spatial Planning. PIs: Talya ten Brink and Anneloes C. Mook
- 2018GS5-006: The Interactions Between Agricultural Expansion and Conservation Prioritization, Discourse, and Practice: a Multi-Scalar Analysis in the Amazon Basin. PIs: Megan Mills-Novoa and Katherine Siegel
- 2018GS5-008: Leveraging Social-Ecological Narratives for Sustainability Insights: How Do Environmental Conditions and Perceptions Interact Along Maine's Storied Coast? PIs: Kacey Stewart and Holly Cronin
- 2018GS5-009: Urban Agriculture Socio-Environmental Synthesis: An Integration of the Ecosystem Services and Livelihoods Approaches to Evaluate the Multifaceted Role of Urban Agriculture in Contemporary Latin America. PIs: Mayra Ivelisse Rodriguez Gonzalez and Jorge Jose Garcia Polo

Graduate Student Pursuits Cohort 6 Granted support in February 2019.

- 2018GS6-001: From Storms to Plowshares: A Multi-Scale Spatial Risk Analysis of Hurricane Maria's Impacts on Puerto Rico's Agro-Food System. PIs: Daniel Shtob and Hannah Stokes-Ramos
- 2018GS6-003: Distilling the Public Discourses and Nexus between Water Quality and Social Inequality. PIs: Helen Rosko and Mitchell Owens

- 2018GS6-006: The globalization of conservation: How public perceptions of biodiversity and international trade patterns shape mangrove conservation. PIs: Natali Ramirez-Bullon, Jacob Bukoski, and Sophia Chau
- 2018GS6-008: Understanding social responses to environmental shocks: A text mining approach. PIs: Matthew Cooper, Aaron Schwartz, and Jeremiah Osborne-Gowey

Expanded Partnership with RFF: Advancing Economic & Ecological Systems Models and Data Granted support in 2019.

SESYNC expanded its partnership with Resources for the Future (RFF) in 2019. A subaward to RFF will support a program on advancing the field of coupled socio-environmental analysis by emphasizing the deeper integration and reconciliation of natural science and economic systems models. This new program includes a portfolio of three Pursuits; these projects are listed below. All three projects have held their first meeting and are advancing with high levels of enthusiasm from participants

- 2018C19-019: Using Integrated Socio-Environmental Networks to Model Common Pool Natural Resource Use and Improve the Management of Environmental Systems. PI: Kailin Kroetz and Laura Dee
- 2018C19-020: Integrative Social Modeling of Private Land Stewardship Decisions in Coupled Social-Ecological Systems. PI: Rebecca Epanchin-Niell and Robyn Wilson
- 2018C19-021: Convergent Modeling of Complex Aquatic Ecosystem Management Problems Using Process-Based Models. PI: Yusuke Kuwayama and Jesus Gomez-Velez

Foundations Granted support in May 2019.

- 2019F-012: Putting people into climate models: A multi-model approach to integrating human behavior and climate change. PIs: Brian Beckage and Katherine Lacasse

Workshops Granted support in 2018 and 2019.

- 2018W-077: Socio-environmental systems indicators for climate change adaptation & resilience in the US. PIs: Keely Maxwell and Jesse Keenan
- 2018W-078: Advancing interdisciplinary research on social-ecological networks to understand ecosystem services across scales. PIs: Laura Dee and Angela Guerrero
- 2019W-079: Data to Motivate Synthesis Workshop 3. SESYNC-led
- 2019W-080: Towards a Practical Environmental Footprint Tool. PIs: Allison Leach and James Galloway
- 2019W-083: 7th Annual Socio-Environmental Synthesis Research Proposal Writing Workshop for Graduate Students.

SESYNC-led

In addition these workshops supported under this award, SESYNC applied for and received external awards to host additional workshops related to NSF programs. The Networks-of-Networks Workshop will take place next fall and will prepare participants to respond to NSF's "Accelerating Research through International Network-to-Network Collaborations" Call for Proposals.

We will also host the third workshop in the series “Geospatial Software Institute: Towards a National Geospatial Software Ecosystem” this summer. SESYNC also received support from NSF to develop and facilitate a workshop, “Accelerating Engineering Research Center Preparedness” for the Engineering Directorate. The workshop was held in Crystal City, VA in October 2018.

Short Courses

- SESYNC will host six short courses during this reporting period, taught by SESYNC staff, former postdocs, and others.
- 2019SC-028: Geospatial Data Analysis Course (March 2019; PIs: Benoit Parmentier and Ian Carroll)
- 2019SC-029: Bayesian Modeling for Socio-Environmental Data (June 2019; PIs: Mary Collins and Tom Hobbs)
- 2019SC-030: Introduction to Social and Ecological Network Analysis (June 2019; PIs: Phillip Staniczenko and Lorien Jasny)
- 2019SC-031: Introduction to Spatial Agent-Based Modeling (June 2019; PI: Nicholas Magliocca)
- 2019SC-032: Summer Institute on Cyberinfrastructure for Socio-Environmental Synthesis (July 2019; PIs: Ian Carroll)
- 2019SC-033: Teaching Socio-Environmental Synthesis with Case Studies (July 2019; PIs: Cynthia Wei and Christine Maietta)

Additional Solicitations

In March 2019 we announced our spring Request for Proposals for team-based collaborative research projects through our Pursuits and Workshops programs. We invited Pursuit proposals focused on the following four topical themes:

- Social and Environmental Dimensions of the Food-Energy-Water Nexus
- Global Change and Health
- Freshwater and Ecosystems in a Changing World
- Socio-Environmental Implications of Large-Scale Infrastructure Projects

We also invited proposals that fall outside of these themes and address other pressing socio-environmental problems. Pursuit and Workshop proposals for this RFP were due on May 15 and will be reviewed by the Scientific Review Committee during a July 2019 panel.