# YEAR 7 ANNUAL REPORT OF THE
# NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER

Reporting on Activities from September 2017 to August 2018

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, educate and engage young scholars and teachers, 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 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, 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 offers a variety of training and professional development opportunities and programming for graduates, postdocs, and scholars. This year, we had 59 qualified applicants for the Postdoctoral Fellowship program, five of whom will be joining the next cohort of fellows. In addition to these, SESYNC collaborated with Georgetown University, RTI International and the World Resources Institute to jointly recruit and mentor postdoctoral fellows (detailed below). One of the motivations for these collaborations is to increase SESYNC postdoc engagement with other types of organizations so the fellows recognize that there are alternate career paths for PhDs. We will have a total of 8 new postdocs at SESYNC next year, bringing the total number of postdocs in residence at SESYNC to 20.

***SESYNC–Georgetown Postdoctoral Fellowships.*** *Ecological Connections: Climate and Health.* The Fellow will co-develop a project designed to address research gaps on the relationship between changing urban environments and children's respiratory health by building a model based on the synthesis of multiple data sets. *Coping with Disaster in a Warming World.* The Fellow will co-develop a project to

address how societies cope with natural disasters, in particular those associated with extreme weather events that are expected to become more frequent and devastating in coming decades. This project will bring together socio-economic data with meteorological and land use data to understand how individuals and societies make decisions both in anticipation of and in the wake of natural disasters.

***SESYNC–RTI Postdoctoral Fellowship: Modeling the Impacts of Food Waste on the Environment.*** The Fellow will model the environmental and ecological impacts of food waste in the United Statesm and will work with Dr. Mary Muth of RTI as his primary Collaborating Research Mentor. This complements a SESYNC project let by Dr. Muth that will hopefully result in identifying options to prioritize waste reduction efforts.

***SESYNC–World Resources Institute Postdoctoral Fellowship: Natural Infrastructure for Water.*** The Fellow will co-develop a project to improve understanding of key hydrological, biophysical, social, and institutional conditions for successful natural infrastructure strategies. Determining why, where, and how to protect and restore forests and working landscapes as a natural form of water infrastructure is a major research challenge.

## Graduate Student Training.

SESYNC has enhanced its program for advanced doctoral students that prepares them to write Pursuit proposals that are competed through a separate graduate student-only RFP. Graduate students supported through this program conduct interdisciplinary team-based syntheses, network across multiple scholarly disciplines and gain skills in conceptualizing and analyzing S-E systems. Graduate teams receive the full suite of support services offered to all teams at SESYNC. At the conclusion of their work all participants are designated SESYNC Graduate Research Fellows. SESYNC offered the fifth "Graduate Student Workshop for Socio-Environmental Synthesis" in January 2018 and a fifth RFP was issued with a May 2018 deadline. As part of a continued effort to increase the reach of the RFP and to accelerate graduate team formation, two informational webinars were held in March. Webinars gave participants an opportunity to ask questions about the RFP and program, pitch ideas, and advertise skill sets to find compatible teams in real time. In April 2018 we announced the sixth Graduate Student Workshop on S-E Synthesis to be held in August 2018 at which time the next RFP will be issued.

## Undergraduate – Under-represented Groups Training.

SESYNC has maintained a strong commitment to broaden participation and build capacity of underrepresented minorities to engage in S-E synthesis research. A fundamental step towards this goal involves motivating underrepresented minority students to consider careers in the environmental arena. To this end, Dr. Cynthia Wei partnered with the GEM Consortium and the University of Maryland's College of Computer, Mathematical, and Natural Sciences and the Clark School of Engineering to host a full day GEM Getting Ready for Advanced Degrees (GRAD) Lab, which aims to motivate and prepare students to apply for graduate degrees. This GEM GRAD Lab highlighted environmental careers. 109 people attended the event, including 76 students from underrepresented groups.

In an additional effort to help build the necessary skills relevant to S-E synthesis research and environmental problem-solving more broadly, SESYNC partnered with the Quantitative Undergraduate Biology Education and Synthesis (QUBES) network to host a Faculty Mentoring Network (FMN), "Investigating socio-environmental issues with data." Fourteen faculty participants, several who work at institutions with large populations of underrepresented minority students, modified and implemented two pre-selected teaching modules focused on a socio-environmental issue and developing quantitative skills.

Several of the pre-selected modules were from the SESYNC case study collection. Participants engaged in bi-weekly calls, and wrote a final report documenting the implementation and modification of the teaching modules.

## Short Courses. In addition to the above, SESYNC continues to offer a comprehensive set of short courses designed to strengthen professional skills and build capacity in the research community.

*Geospatial Data Analysis Short Course*. For the first time, this year SESYNC offered a workshop to introduce participants to open-source tools for geospatial and temporal analysis of vector and raster data. The workshop emphasized R packages and, to a lesser extent, Python libraries commonly used in GIS. The Short Course was led by SESYNC's cyberinfrastructure team.

*Cyberinfrastructure for SES.* 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. In addition to the upcoming July 2018 Summer Institute on Cyberinfrastructure, SESYNC continues to offer data skills workshops (e.g., SESYNC Data Scientist Dr. Benoit Parmentier co-led a Geospatial Analysis workshop at the AAG Annual Meeting to introduce open-source computing resources for geospatial and temporal analyses of S-E issues).

*Introduction to Spatial Agent-Based Modeling (ABM).* Offered in June 2018, 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.

*Introduction to Social Network Analysis (SNA).* This annual short course offered will be offered in July 2018 and serves as an introduction to the theory and practice of SNA. SNA looks to the relationships among observations to try to explain why different configurations of relationships might exist, or how this network structure explains other attributes of the network. This course is intended as a foundational course for anyone interested in adding SNA to their analytical toolkit.

*Bayesian Modeling for S-E Data.* Bayesian hierarchal models provide a powerful approach to analysis of socio-environmental problems that are complex and that require synthesis of knowledge. This annual short course was offered in June 2018 and covered the basic principles of using Bayesian models to gain insight from data and provided the conceptual foundations and quantitative confidence needed for self-teaching modern analytical methods.

# IMPACT

## Socio-Environmental Science.  SESYNC continues to be a primary nexus for productive research among a wide range of disciplines necessary for S-E synthesis and research. Over the past year we have used our refined theory of change to help focus our efforts for impact in key areas that we feel must advance. Our core processes for the development of research projects continues to help researchers from many disciplines develop stronger conceptualizations of S-E problems and in a practical sense, better proposals. 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. We have made a concerted effort to emphasize that our intent is to support truly integrative synthesis research, essentially "raising the bar" in new ways. That challenge is having a clear impact on teams over the past year.

We have expanded 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 aspects of 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 has made a special effort to engage and influence a larger community of early career scholars. This includes an expansion of both the Postdoctoral Fellowship and Graduate Student programs, as well as short courses and selected workshops. Feedback from these efforts (especially the graduate program workshops) emphasize that we are having a definitive impact at the right moment for many participants in this demographic. The opportunity to build skills and engage with a new interdisciplinary community has been important and impactful.

SESYNC made a concerted effort to advance S-E modelling over the past grant year. We are becoming an important platform for an emerging community of scholars and practitioners who are now collaborating in new ways to extend the conceptual and methodological boundaries of this important approach to understanding S-E systems. This effort should bear fruit as we move into our next grant year.

We also have recognized that there are many ways to build capacity for S-E research. On a more "macro-level", there has been tremendous growth in the number of institutions and programs that now focus on many forms of interdisciplinary environmental research. However, there has not to date been a forum for the leaders of these entities to come together to share experiences and best practices. Our first-of-its-kind workshop for such leaders was very important. Attendees all noted that they came away with new ideas and a greater sense that a community of practice for organizational leaders will have high impact in the coming years. SESYNC is working to help make that a reality.


A Focus on Interdisciplinary Process. 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 "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, 16% of SESYNC participants come from outside academia and 70% of the 20 research teams reporting include knowledge users. Such sectoral diversity is key in the SESYNC model and helps ensure actionability.

Of the participants from all (Pursuit, Workshop, Foundation, and Short Course) programs reporting self-characterization, 135 chose natural scientist (35%), 100 chose social scientists (26%) and 6 chose computer scientist (2%). Twenty-four participants self-reported as NGO, government, policy, or industry (6%), 98 self-reported as both natural and social scientist (26%), and 20 self-reported as other (5%). Of those reporting their institutional status specifically from our core programs (Pursuits, Workshops, and Foundations), there are 198 academics, 30 knowledge users, and 7 participants who classify as both. Of those classified as "knowledge users", 51% come from the NGO/non-profit sector, 38% from the government sector, and 11% from the business/industry sector.

Participants are also asked to identify their primary disciplinary area of expertise. The disciplinary diversity, specifically of those characterized as "scholars" responding to the demographic survey, is illustrated in the percentages within each domain below.

- Life sciences: 31%

- Social sciences: 35%

- Geosciences: 14%

- Computer Science and Engineering: 2.5%

- Policy: 7.5%

- Humanities: 5%

- Other (e.g., business, education, public health): 4%

As previously mentioned, Bethany Laursen, a doctoral student in applied philosophy from Michigan State University, will work at SESYNC during the current summer and will collaborate with center staff 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.

## Actionable Science.
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. 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.

## Human Resources.
Through this reporting period, SESYNC has supported 491 individual participants on this award representing 28 initiated projects (Pursuits, Foundations, Workshops, and Short Courses). We received 59 applications for postdoctoral fellowships in December 2018, as well as 33 proposals for team synthesis projects from the biannual Pursuit and Workshop RFP in October 2017, and 27 proposals for team synthesis projects from the Graduate Student Pursuit RFP and biannual Pursuit and Workshop RFP in May 2018.

For those participants who filled out the survey through May 2018, the following percentages illustrate SESYNC's cumulative impact of this award on the development of human resources (from September

2016 through this reporting period). SESYNC's response rate for the demographic survey is roughly 78% for this award.

Of those reporting, SESYNC has supported 174 men and 253 women (41% and 59%, respectively), and approximately 87% of participants are from the United States and 13% of participants are international. As previously mentioned, within the demographic survey, participants are asked to self-characterize as natural scientist, social scientist, both natural scientist and social scientist, computer scientist, policy, NGO, government, business/private sector, or other. Of those reporting, 135 chose natural scientist (35%), 100 chose social scientists (26%) and 6 chose computer scientist (2%). Twenty-four self-reported as NGO, government, policy, or industry (6%), 98 self-reported as both natural and social scientist (26%), and 20 self-reported as other (5%).

SESYNC's race and ethnic diversity of all participants who filled out a demographic survey 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: 69% (67.6%)

- Asian or Pacific Islander: 13% (11.7%)

- Black: 4% (4.7%)

- Hispanic: 3% (5.8%)

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

- Multi: 10% (Indicators category of "Other or Unknown Race or Ethnicity": 9.6%)


SESYNC has maintained a strong commitment to broaden participation and build capacity of underrepresented minorities to engage in S-E synthesis research. A fundamental step towards this goal involves motivating underrepresented minority students to consider careers in the environmental arena. To this end, Dr. Cynthia Wei partnered with the GEM Consortium and the University of Maryland's College of Computer, Mathematical, and Natural Sciences and the Clark School of Engineering to host a full day GEM Getting Ready for Advanced Degrees (GRAD) Lab, which aims to motivate and prepare students to apply for graduate degrees. This GEM GRAD Lab highlighted environmental careers. 109 people attended the event, including 76 students from underrepresented groups.

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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 and 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. Participants from 28 non-academic institutions will be directly involved in Pursuits supported during this award period; those meetings will be initiated this summer and fall. Other teams undertake projects that potential knowledge users have identified as important to our mission. Of those reporting demographic information from our core programs supported from this award, 16% of SESYNC participants come from outside academia and 70% of the 20 research teams reporting include knowledge users.

Non-academic knowledge users are also represented on both the External Advisory Board (e.g., WRI, NOAA, Microsoft, Walton Family Foundation) and the Scientific Review Committee (e.g., Union of Concerned Scientists, RFF, USGS, WWF). 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.

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

- *Foundation: Food Waste and the Environment.* The objective of this project is to define and measure the ecological and environmental impacts of food loss and waste across the U.S. food system taking into consideration losses during agricultural production itself through landfill disposal of waste. The project will provide actionable results that to help target cost-effective food waste reduction efforts under public and private initiatives. The project includes knowledge user participants from RTI, Microsoft, EPA, and LeanPath.

- *Pursuit: Mitigating Oceanic Plastic Pollution.* This team will develop and validate a public online tool for groups to evaluate intervention scenarios aimed at addressing the global challenge of marine plastic pollution. This tool will allow regional agencies, industry, and NGOs to run regionally specific scenarios to predict how policy and management actions will reduce plastic pollution. The project includes knowledge user participants from FWS International, the Fallifrey Foundation, the 5 Gyres Institute, Ocean CleanUp, and the Ocean Conservancy.

- *Pursuit: Putting Pesticides on the Map.* This team will synthesize existing public data sets on pesticide use, pesticide toxicity, and land use to generate several novel indices that reflect spatial and temporal patterns of aggregated pesticide use and potential toxicity to pollinators. They will

then combine these toxicity-adjusted pesticide use indices with existing landscape data on pollinator habitat and demand for pollination services to identify potential 'hotspots' of exposure (and pollinator loss) in agro-ecosystems. The indices will be incorporated with existing models to guide the selection of sites for conservation efforts for wild bees, honey bees, and the monarch butterfly. The project includes knowledge user participants from USDA, Xerces Society, and EPA.

- *Pursuit: Planning for Sustainable Water Futures in Sub-Saharan Africa in the Context of the SDGs.* The goal of this Pursuit is to aid planning for sustainable water futures in sub-Saharan Africa built around provision of freshwater ecosystem services (FWES), in support of achieving the UN's Sustainable Development Goals. The team will synthesize existing knowledge and data across sub-Saharan Africa on FWES and the distribution and role of grey infrastructure. They will then explore decision criteria for defining optimal mixes of green, grey and blended solutions in support of sustainable water futures. The project includes knowledge user participants from Conservation International, IUCN Water, The Nature Conservancy, WaterLex International Secretariat, NASA/SERVIR, and the Gaborone Declaration for Sustainability in Africa.

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 post doc 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 makers. It also includes a diverse set of speakers with deep practical knowledge of how science can matter to public discourse and decisions.

# DISSEMINATION OF REULTS

SESYNC's communications program translates and disseminates research results, promotes the Center's programs, and builds the capacity of the Center's researcher community to engage with broad audiences outside of academia. Our strategy in this regard is based on producing high-impact digital communication products and 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. To date in the current grant year, the SESYNC website received 44,967 total visits. Aside from the homepage and our opportunities page, we received the majority of traffic on pages describing our Graduate Student Program, biannual RFP for team-based Pursuits, Postdoctoral Fellowship Program, and the Bayesian Modeling for Socio-Environmental Data Short Course. 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 3,550 to 4,659 and our Facebook community has grown from 1,064 to 1,178. Our Monthly newsletter currently reaches 3,698 people and the SESYNC YouTube channel now has 1,052 subscribers.

Of particular note, SESYNC enhanced its in-house capacity to produce several high quality videos for distribution via our YouTube channel and website. Over the past year, our resident Multimedia Specialist developed the concept for the "Research in Action" videos that focus on SESYNC synthesis projects. She completed and posted the first of these 7-8 minute short-form films ("Wildfire and Salience") and will complete a second ("Adaptive Water Governance") this summer. She also completed two animated shorts ("What is Actionable Science?" and "Tips for Submitting Your Research Proposal") that provide information to those wishing to engage with SESYNC's research program. In addition to these, she also produced 5 videos centered on the variety of different types of data that can be utilized for socio-environmental research. These include an overview of the different types of data used by SESYNC researchers and an example from a SESYNC postdoctoral fellow, as well as specific videos on the following: "Qualitative Data"; "Qualitative Comparative Analysis"; "Sentiment Data"; and "Systems Dynamics & Agent Based Modeling".

SESYNC's Senior Fellow for Socio-Environmental (S-E) Understanding Lisa Palmer actively engages in communicating science of SESYNC to new audiences and takes part in national and international dialogue on socio-environmental issues through writing and publishing, public speaking, and leading and developing seminars. The Senior Fellow had over 210 direct new interactions with scholars, knowledge users and decision makers during the reporting period, resulting in interviews, sharing of knowledge, and bridging science. For example, one of these interactions included facilitating introductory meetings between the director of public policy and research at the World Food Program US and principal investigators of two SESYNC-supported Pursuits. The Senior Fellow also facilitated discussions with the SESYNC Foundation "Food Waste and the Environment" to assist them with identifying key influencers, developing messages, and an analysis for a commentary-style communication product; she also guided communications strategy for postdoctoral fellows.

# 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 funded 43 Pursuits, Foundations, Workshops, and Short Courses to date on this award through year two. During this reporting period, we've supported the following 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 3 open RFPs that resulted in **10** new Pursuits (two RFPs are currently under review).

- Workshops: Single meetings focused on development of a new topic, under developed field or promising idea. **7** Workshops were supported this year.

- Foundations: Recruited projects on critical, emerging or understudied topics, or efforts that bring new disciplinary perspectives to S-E scholarship. **1**Foundation has been initiated this year.

- Short Courses: Bayesian Approaches; Database Management; Introduction to and Use of Cyber Tools. **5** Short Courses were initiated in this reporting period.

- Fellowships: **4** Postdoctoral Fellows, **1** Sabbatical Fellow, and **3** Short-term Visitors were supported in this reporting period.

  In addition to the above, 2 Foundations and 11 Pursuits, of which 5 are graduate student-led, initiated their first meeting during this reporting period.

## Newly Funded Projects.  Listed below are projects that were granted funding from RFPs or announcements solicited after September 1, 2017.

**OCTOBER *2017 RFP/COHORT 17: Collaborative & Interdisciplinary Team-based Research Projects***

- PIs Sandy Leibhold and Mike Springborn: "Global socioeconomic drivers of insect invasions"

- PIs Andres Baeza and Mercedes Pascual: "Synergistic interactions of environmental degradation, socio-economic development and infectious disease dynamics in the Amazon region"

- PIs Gabrielle Roesch-McNally and Andrea Basche: "Soil as a social ecological feedback: Mapping the social and ecological processes for agroecosystem resilience in the era of climate"

- PIs Alder Keleman Saxena and Garrett Graddy-Lovelace: "Understanding how agricultural biodiversity enhances food security & nutrition"

- PIs Xin Zhang, Kimberley Pfeifer, and Eric Davidson: "Understanding dynamic environmental and socio-economic interactions in food systems to support decision-making towards a sustainable and resilient agriculture"

- PIs David Hole and Charles Vorosmarty: "Planning for sustainable water futures in sub-Saharan Africa in the context of the SDGs"

- PIs Lea Johnson Michelle Johnson: "Social-ecological drivers of change over time in urban woodlands"

- PIs Karl Zimmerer and Karen Seto: "Linkages of Agrobiodiversity in Urban Systems and Food-Producing Landscapes"

- PI Nina Fefferman: "Modeling risk perception, vector-borne diseases, and environmental integrity: understanding environmental impacts of policy decisions for vector control"

- PI Elizabeth Borer: "Microbial disease dynamics, ecosystem processes, and human eutrophication of the environment"

### *WORKSHOPS*

- PIs Sondoss Elsawah and Albert Kettner: "Use of socio-environmental systems modelling in actionable science: State-of-the-art, open challenges and opportunitiesmodelling socio-environmental systems"

- PIs JB Ruhl, Barbara Cosens, and Niko Soininen: "Adaptive governance for freshwater socio-ecological system resilience – Theory, practice and comparison between the US and Northern Europe"

- PIs Gabriele Bammer and Jonathan Kramer: "Interdisciplinary research matters: Pathways to successful organizational models"

- PI Cindy Wei: "QUBES-SESYNC Faculty Mentoring Network"

- PI Betsy Cody: "Ecosystem restoration governance"

- PIs Graham McDonald and Verena Seufert: "Wicked problems in food systems solutions"

- PIs Nicole Motzer and Jonathan Kramer: "Graduate Student Workshop on S-E Synthesis"

### *FOUNDATION*

- PIs Carole Crumley, Carrie Hritz, and Christian Isendahl: "If the past teaches, what does the future learn?"

### *SHORT COURSES*

- Geospatial Data Analysis Short Course (PIs: Ian Carroll, Benoit Parmentier, Mary Shelley, and Kelly Hondula, April 2018)

- Bayesian Modeling for Socio-Environmental Data (PIs: Tom Hobbs, Christian Che-Castaldo, and Mary Collins, May 2018)
- Introduction to Spatial Agent-Based Modeling (PI: Nick Magliocca, June 2018)
- Introduction to Social Network Analysis (PI: Lorien Jasny, July 2018)
- Summer Institute on Cyberinfrastructure for Socio-Environmental Synthesis (PI: Ian Carroll, July 2018)

### *ADDITIONAL SOLICITATIONS*

In March 2018 we announced a request for proposals for team-based collaborate research projects in the form of Pursuits or Workshops. Pursuit teams were invited to apply under the following three Themes: Water, People, and Ecosystems; Social and Environmental Dimensions of the Food-Energy-Water Nexus; and Sudden or Unexpected Events: Environmental Recovery, Reorganization or Restoration. Pursuits were also invited to a submit proposals not explicitly tied to a Theme ("socio-environmental problem-focused"). The deadline was May 15, 2018, and the Scientific Review Committee will meet in July 2018 to discuss their recommendations.

In January 2018 we held the fifth Graduate Student Workshop on Socio-Environmental (S-E) Synthesis. The Workshop targeted graduate students interested in S-E synthesis research and focused on building capacities through S-E synthesis training, skill-building, and networking. Workshop sessions and activities were led by noted S-E synthesis scholars and practitioners, and included synthetic proposal writing and research design, the science of team science, and science communication and delivering actionable outcomes for stakeholders and decision makers. The workshop culminated in the release of an RFP for new graduate student led pursuit proposals. Proposals resulting from this call will be reviewed in

July 2018. In April 2018 we announced the sixth Graduate Student Workshop on Socio-Environmental (S-E) Synthesis to be held in August 2018. This will initiate a twice-yearly proposal solicitation cycle that will significantly increase opportunities for graduate student led research at SESYNC.